Clyde Hubbard
9297 Siempre Viva Rd.
Suite MX 021-050
San Diego, CA 92173

Cuernavaca, Mor., Mexico
March 21, 1995

Mr. Eric P.Newman
6450 Cecil Avenue
St. Louis, Missouri 63105

Dear Eric:

Your visit to Cuernavaca was too brief so you will have to come back and continue where we left off. Thank you for the photocopies of the Burnie Mail Fraud Scandal and Burnie's flight to Mexico. The story was new to me.

The day after you left I had copies made of the Britannica section on money but kept searching for another item I thought I had on clay pipes that Bob Marx brought up from Jamaican waters. Can't find it but will keep looking.

Your peso check for 419 pesos also came. You probably assumed that I made the deposit by credit card. Since I do not have any credit cards at all I made it in cash at the exchange of 3.15 When your check came the exchange was 5.15 so I took a beating. Next time plan to stay at Casa Hubbard and save us both money. We are not elegant but have simple laboratory facilities for mixing medicines and alcoholic beverages.

Yearly visitors to Hosteria Las Quintas are Larry and Zoe Levinson who said he had contacted you years ago with reference to the estate of his brother who had a coin collection. We had dinner with them when they were here recently. They live in Massachusetts, Newton, I think.

You are contacted by big-time collectors; the small ones find me. Latest one was this week when I checked over an accumulation left by a writer who was associated many years with Life, Time and Readers Digest. His daughter called me to see what he had left and I spent an hour mostly sorting silver from clad coinage and came up with $64.50 face value of the silver coins. Another collection I am still working on has about $70,000. AGW with some but not much numismatic plus. It includes around 560 gold coins and medals of assorted countries. Silver still to be checked is mostly of bullion value.

Although I had lunched with the writer friend some time ago in his house I had not seen his library, the titles of which looked promising when I went there this week. He wrote about economics. They say I can start looking when I return next week from Chicago.

A collector friend invited me to attend CICF which I have not done for several years. He comes to our Mexico shows; next one is in May.

I was very disappointed to learn that our Princeton Class of 1938 mini-reunion is San Antonio is scheduled on the same weekend as your fabulous St. Louis book sale. I was looking forward to seeing your museum treasures and buying half a ton of books at the sale.

Thank you for writing to my friend Sr. Porrua. He is always proud to show such letters to the former director of the mint who had the book published, and your letter will certainly give him great pleasure.

DICCIONARIO DE LA MONEDA HISPANOAMERICANA
HUMBERTO F. BURZIO   FONDO HISTORICO Y BIBLIOGRAFICO JOSE TORIBIO MEDINA
SANTIAGO DE CHILE, 1958   VOL I   page 120:

CUENTA, Moneda de - Llamada tambien imaginaria o ficticia. Se dice de la admitida en las transacciones comerciales, actos públicos o contratos, como unidad ideal de valor aunque relacionada con la moneda en curso para la efectividad del compromiso.

Puede haber tenido existencia en una epoca anterior y a pesar de no circular, continuar siendo usada en las obligaciones monetarias, o bien nunca haber existido como moneda acuñada y sin embargo, ser utilizada como unidad de valor

ACCOUNT, Money of - Also called imaginary or ficticious. This term is applied to money received in commercial transactions, public acts or contracts, as an ideal unit of value although related with current money for the purpose of the obligation.

It may have existed in a previous period and in spite of not being in circulation, continues to be used in monetary obligations, or on the other hand never did exist as coined money, yet was used as a unit of value.

En la America española existieron diversas monedas de cuenta, provenientes algunas de la Metropoli y otras de origen vernaculo.

In Spanish America various moneys of account existed, some originating in Spain and others of local origin.

Two tables follow the explanation. The first table refers to moneys of account as of the law of May 16, 1737 and the second table lists terms used at the time of independence of the Spanish American possessions.

On page 122 a detailed account is given for terms used in business transactions outside of Spain. and this would apply to the period you are studying:

Escudo de plata, peso escudo de plata o peso de cambio. Moneda imaginaria usada en el comercio exterior de España. Era el "peso de plata antigua o vieja" y equivalía a 10 Rs. de plata en su valor intrínseco. La Real Cédula de Carlos II, de 14 de octubre de 1686, le fijó el valor de 15 Rs. de vellón. En 1726 se le fijó un nuevo valor de 9 1/2 Rs. de plata, igualándolo al "peso fuerte de América". La Pragmática de Felipe V, de 16 de mayo de 1737, dispuso que su valor fuese en América de 20 Rs. de vellón (680 mrs.), en vez de los 18 Rs. 28 mrs. anteriores. Equivalia, por lo tanto, al "peso grueso". A comienzos del siglo XIX su valor era de 272 mrs. de plata o 512 mrs. de vellón y era moneda imaginaria para uso del comercio exterior de España.

SILVER ESCUDO, SILVER ESCUDO PESO OR EXCHANGE PESO. Imaginary money used in commerce outside of Spain. It was the "old or former silver peso" equivalent to 10 Reales of silver in intrinsic value. The Royal Edict of Charles II of October 14, 1686, fixed its value at 15 Reales of billon. In 1726 a new value was assigned to it amounting to 9 1/2 Reales of silver, making it equal to the "American peso fuerte" The law of Philip V dated May 16, 1737 specified that its value in America be 20 Reales of billon (680 maravedis), instead of the previous 18 Reales 28 maravedis. Therefore it was equivalent to the "peso grueso". At the beginning of the 19th century its value was 272 maravedis of silver or 512 maravedis of billon and was an imaginary money for the purpose of commerce outside of Spain.

Party season is just about over so we can get back into the groove. Parties are fun but it is nice to be able to relax in the evenings with no obligation to dress up and go out.

Found another story with a slight numismatic twist in A TREASURY OF SEA STORIES by Gordon C. Aymar, A.S.Barnes & Co., N.Y.1948. It is an excerpt from Guy Gilpatric's THE FLAMING CHARIOT, from Scotch and Water. Only 11 pages long. Will copy if you can't find it.

Maybe you will be in Chicago. If not I will send this to you from there on Friday.

Temperatures are now a bit warm in the high 80's. The country is heating up in other ways as you may notice from newscasts. The next few months will be sticky. Banks are all broke and overdue loans exceed total capital of the 15 main banks. Taxes, transportation and costs of almost everything are up - everything except wages which always lag far behind after devaluations. The working man pays for the mistakes of politicians.

Well, with that I wili climb down from my soap box and find an envelope for this letter and the photocopies.

All the best to you and Evelyn.

Sincerely,

Clyde

Clyde Hubbard

ERIC P. NEWMAN NUMISMATIC EDUCATION SOCIETY

6450 Cecil Avenue, St. Louis, Missouri 63105

Craig Sholley
109 W. Big Spring Ave
Newville, PA 17241

September 9, 1997

Dear Craig:

I was glad to receive your letter, the greetings from Dick Johnson, news of your Rittenhouse Society breakfast, etc. After my wonderful African adventure I have been doing some thinking and I am going to share with you fully my mint machinery information because I am too overloaded with research and writing and think you are the person to lead and carry on the mint machinery research. I want to participate in whatever is done with the material I have been fortunate enough to locate.

The answer to your question about not finding any anti-clashing or cushioning mechanism is easy. It is in the text to a great extent but can be seen on the side walls where the swinging beam bumps. The text will clear this up.

The data enclosed has been sought by me for years. It was found by serendipity when I was poking in a private library waiting for a friend to finish a telephone conversation.

I was familiar with the first edition of the Encyclopedia Britannica as to coinage and minting. It never occurred to me to look in subsequent editions for revisions. My friend has Supplement to the 4th, 5th, and 6th editions printed in 1824 in London. I saw the article under coinage (pp. 222-249) written by A.A., including Plates LXI, LXII, LXIII, and LXIV dated 1813. I noticed the plates were dated 11 years before the publication date.

Then a year or so later I acquired originals of Plates CC, CCI and CCII engraved by H. Andersen and undated. I realized that there was a revision of plates and therefore must have been a revision of text, but because of the early obsolete mint machinery knew that plates CC etc. were earlier than LXI, etc. in The American Edition of the New Edinburgh Encyclopaedia (Phila. 1815). This text is entitled Coining Machinery and is signed J.F. That is as far as I have gone, but I realize there must be many printings prior to the 1815 which may or may not have variances. Some one needs to check the 2nd, 3rd, 4th and perhaps 5th and 6th editions of the London printings of Britannica and any other printings of the New Edinburgh Encyclopaedia during that era. The titles of the articles may have changed or been consolidated, rewritten or whatever. Whether the Encyclopaedia Britannica and the New Edinburgh Encyclopaedia are the same or different publications, I do not know. Those editions are available at various American libraries but no one library seems to have more than a couple of them. Will you undertake to get copies of any articles which are different from the two which are enclosed or the one in the first edition ? Also can you determine which editions repeat which articles? I think there is more to be found. I would be shocked if the Edinburgh edition was reset and reprinted in America as perhaps only the title page would be and the balance printed from stereotype sent from England or the pages printed in England. I am not hung up on why there is an American edition of an English Encyclopaedia but only want all the text in the applicable articles. Give me your thoughts after reading the enclosed two texts. You already have the plates but I'll send new sets if needed. Other items mentioned by you will have to wait.

I do not use e-mail. My thinking is better by use of script first. I realize the advantages of a P.C. etc. but I have to use the computer I was born with. You are the lucky ones to have life simplified.

Numismatic problems are fascinating,

My best,

E

Eric P. Newman

ERIC P. NEWMAN NUMISMATIC EDUCATION SOCIETY

6450 Cecil Avenue, St. Louis, Missouri 63105

Ms. Shanta Uddin
Encyclopedia Britannica
310 S. Michigan Ave
Chicago, IL 60604

February 2, 1999

It was a pleasure talking to you about our problem of finding the text for material in the early editions of Encyclopedia Britannica.

Our goal is to find the changes in content of an article(s) on a subject and its accompanying plates in the various editions prior to 1824, whether published in London, Edinburgh or America under various titles.

The subject is "Coining", "Coinage", "Coining Machinery" or perhaps "Minting" or "Minting Machinery".

This project has been stimulated by the location at the Library Company of Philadelphia of The American Edition of the New Edinburgh Encyclopedia, conducted by David Brewster, (Philadelphia, Published by Edward Parker, 1815). You do not seem to be familiar with this publication which obviously was derived from the Encyclopedia Britannica and even uses its plates. We do not have copies of the title page or preface but enclose a copy of the article furnished to us by Philip Lapsansky at the Library Company. We do not know if there are other American editions, authorized or pirated.

We have a copy of the article entitled "Coinage" on pp. 130-131 and plate CXLIV of the first E.B. edition (1768-1771).

We do not have whatever was included in the second edition (1777-1784) which had 200 plates. We need a copy of this if there is an article on the subject. If you can locate one we can order a copy of the pages from one of the institutions which has it.

We do not have whatever was included in the third edition (1788-1797) of 18 volumes, 542 plates. We can order this if you find it and give us the page and plate numbers; also the name or initials of the writer, which is usually at the end of the article, would be most helpful.

Perhaps there is something on the subject in the Supplement to the third edition of Encyclopedia Britannica, 2 vols., 50 plates, Edinburgh 1801. There should be something on the subject in the fourth edition of Encyclopedia Britannica 1801-1809, 20 vols., 600 engravings, Edinburgh.

There may be something different on the subject in the fifth edition of Encyclopedia Britannica (1815) as it is a corrected reprint of the fourth edition, with the same number of volumes and plates.

The six edition of Encyclopedia Britannica may be the same as the 5th, but there is always a possibility of a change in the article we seek.

We do have a copy of the text and the plates in the 1815-1824 Supplement to the fourth, fifth and sixth editions. This supplement has an article on "Coinage" pp. 222-249 with plates LXI, LXII, LXIII & LXIV which would indicate that the subject may not be included in the fourth, fifth, & sixth editions but it may be a revision of an article in them.

Encyclopedia Britannica and its copiers seem to be the best source of the details in the major changes in the process of coining which were taking place in Britain and America during the period. It is possible that certain misleading statements were made by ignorance or design.

We will gladly answer further inquiries. Our telephone number is 314-727-0850, our FAX is 313-727-0820.

We are very grateful for your interest and cooperation in this matter and we hope you will derive important new material on the history of Encyclopedia Britannica from our research.

Sincerely,

EPN

Eric P. Newman

cc: Peter Gaspar

ERIC P. NEWMAN NUMISMATIC EDUCATION SOCIETY

6450 Cecil Avenue, St. Louis, Missouri 63105

April 2, 1999

Ms. Shanta Uddin
Encyclopedia Britannica
310 S. Michigan Ave
Chicago, IL 60604

Dear Ms. Uddin:

I was looking forward to an answer to my letter dated February 2, 1999 (copy enclosed) but presume you need more time.

If I asked for too much would you merely look at the third edition 1788-1797 which has 18 volumes and 542 plates to see if it has an article on Coinage. Also the fourth edition.

Maybe it would be helpful to write to the author of the history of E.B. to see if she knows of the American printed copies or editions of E.B.

Please be kind enough to advise me concerning the foregoing.

Thank you for your cooperation,

Eric P. Newman

ENCYCLOPAEDIA BRITANNICA
EDITORIAL LIBRARY
310 SOUTH MICHIGAN AVENUE
CHICAGO, IL 60604

FACSIMILE TRANSMITTAL SHEET

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COMPANY:	DATE: 07/07/99
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RE:	YOUR REFERENCE NUMBER:

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I hope this helps. I am also sending you a hard copy of this in the mail.

ERIC P. NEWMAN NUMISMATIC EDUCATION SOCIETY

6450 Cecil Avenue, St. Louis, Missouri 63105

August 18, 1999

Ms. Shanta Uddin
Editorial Library
Encyclopaedia Britannica
310 Michigan Ave
Chicago, IL 60604

Dear friend:

Both of us were on vacation as I delayed thanking you for the photocopies of plates from the third edition of the Britannica. The material was very helpful and was added to my prior data as well as published in an article on certain coining practices used in 1815 in Philadelphia.

There is now a final endeavor to see what coining plates there may be in the 4th & 5th editions of the Britannica. Each edition has 600 plates. The pirated American edition of 1815 had to reuse or copy plates which either were previously published or prepared for publication and for some reason not used. They are numbered plates CC, CCI, and CCII in the pirated edition.

Will you be kind enough to look at the 600 plates for the 4th & 5th edition to see if there is anything on coins, coining machinery, minting, minting machinery or numismatics. If there is I would be grateful for a photocopy.

I sincerely appreciate your cooperation and look forward to hearing from you.

Cordially,

Eric P. Newman

3rd Edition 1797

ENCYCLOPÆDIA BRITANNICA;

OR, A

DICTIONARY

OF

ARTS, SCIENCES,

AND

MISCELLANEOUS LITERATURE;

Conſtructed on a PLAN,

BY WHICH

THE DIFFERENT SCIENCES AND ARTS
Are digeſted into the FORM of Diſtinct

TREATISES OR SYSTEMS,

COMPREHENDING

The HISTORY, THEORY, and PRACTICE, of each,
according to the Lateſt Diſcoveries and Improvements;
AND FULL EXPLANATIONS GIVEN OF THE
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THE THIRD EDITION, IN EIGHTEEN VOLUMES, GREATLY IMPROVED.

ILLUSTRATED WITH FIVE HUNDRED AND FORTY-TWO COPPERPLATES.

VOL. V.

INDOCTI DISCANT, ET AMENT MEMINISSE PERITI.

EDINBURGH:
PRINTED FOR A. BELL AND C. MACFARQUHAR.
MDCCXCVII.

Coin, Coinage.

	l.	s.	d.
According to the decuple proportion, mentioned by Livy and Julius Pollux, worth	0	12	11
According to the proportion mentioned by Tacitus, and which afterwards obtained, whereby the aureus exchanged for 25 denarii, its value ——	0	16	1¾

Coin, in architecture, a kind of dye cut diagonalwiſe, after the manner of a flight of a ſtair-caſe, ſerving at bottom to ſupport columns in a level, and at top to correct the inclination of an entablature ſupporting a vault.

Coin is alſo uſed for a ſolid angle compoſed of two ſurfaces inclined towards each other, whether that angle be exterior, as the coin of a wall, a tree, &c. or interior, as the coin of a chamber or chimney. See Quoin.

COINAGE, or **Coining**, the art of making money, as performed either by the hammer or mill.

Formerly the fabric of coins was different from what it is at preſent. They cut a large plate of metal into ſeveral little ſquares, the corners of which were cut off with ſheers. After having ſhaped theſe pieces, ſo as to render them perfectly conformable, in point of weight, to the ſtandard piece, they took each piece in hand again, to make it exactly round by a gentle hammering. This was called a *planchet*, and was fit for immediate coining. Then engravers prepared, as they ſtill do, a couple of ſteel maſſes in form of dyes, cut and terminated by a flat ſurface, rounded off at the edges. They engraved or ſtamped on it the hollow of a head, a croſs, a ſcutcheon, or any other figure, according to the cuſtom of the times, with a ſhort legend. As one of theſe dyes was to remain dormant, and the other moveable, the former ended in a ſquare priſm, that it might be introduced into the ſquare hole of the block, which, being fixed very faſt, kept the dye as ſteady as any vice could have done. The planchet of metal was horizontally laid upon this inferior maſs, to receive the ſtamp of it on one ſide, and that of the upper dye, wherewith it was covered, on the other. This moveable dye, having its round engraved ſurface reſiſting upon the planchet, had at its oppoſite extremity a flat ſquare, and larger ſurface, upon which they gave ſeveral heavy blows, with a hammer of an enormous ſize, till the double ſtamp was ſufficiently, in relievo, impreſſed on each ſide of the planchet. This being finiſhed, was immediately ſucceeded by another, and they thus became a ſtandard coin, which had the degree of fineneſs of the weight and mark determined by the judgment of the inſpectors, to make it good current money. The ſtrong tempering which was and is ſtill given to the two dyes, rendering them capable of bearing thoſe repeated blows. Coining has been conſiderably improved and rendered expeditious, by ſeveral ingenious machines, and by a wiſe application of the fureſt phyſical experiments to the methods of fining, dyeing, and ſtamping the different metals.

The three fineſt inſtruments the mint-man uſes, are the laminating engine; the machine for making the impreſſions on the edges of coins; and the mill.

After they have taken the laminæ, or plates of metal, out of the mould into which they are caſt, they do not beat them on the anvil, as was formerly done, but they make them paſs and repaſs between the ſeveral rollers of the laminating engine, which being gradually brought cloſer and cloſer to each other, preſently give the lamina its uniform and exact thickneſs. Inſtead of dividing the lamina into ſmall ſquares, they at once cut clean out of it as many planchets as it can contain, by means of a ſharp ſteel trepan, of a roundiſh figure, hollow within, and of a proportionable diameter, to ſhape and cut off the piece at one and the ſame time. After theſe planchets have been prepared and weighed with ſtandard pieces, filed or ſcraped to get off the ſuperfluous part of the metal, and then boiled and made clean, they arrive, at laſt, at the machine (fig. 1.), which marks them upon the edge; and finally, the mill (fig. 2), which, ſqueezing each of them ſingly between the two dyes, brought near each other with one blow, forces the two ſurfaces or fields of the piece to fill exactly all the vacancies of the two figures engraved hollow. The engine which ſerves to laminate lead, gives a ſufficient notion of that which ſerves to flaten gold and ſilver laminæ between rollers of a leſſer ſize.

Coinage.

Plate CXLIV.

The principal pieces of the machine (fig. 1.), to ſtamp coins on the edge, are two ſteel laminæ, about a line thick. One half of the legend, or of the ring, is engraved on the thickneſs of one of the laminæ, and the other half on the thickneſs of the other; and theſe two laminæ are ſtraight, although the planchet marked with them be circular.

When they ſtamp a planchet, they firſt put it between the laminæ in ſuch a manner, as that theſe being each of them laid flat upon a copper-plate, which is faſtened upon a very thick wooden table, and the planchet being likewiſe laid flat upon the ſame plate, the edge of the planchet may touch the two laminæ on each ſide, and in their thick part.

One of theſe laminæ is immoveable, and faſtened with ſeveral ſcrews; the other ſlides by means of a dented wheel, which takes into the teeth that are on the ſurface of the lamina. This ſliding lamina makes the planchet turn in ſuch a manner, that it remains ſtamped on the edge, when it has made one turn. Only crown and half-crown pieces can bear the impreſſion of letters on the thickneſs of their edges.

The coining engine or mill is ſo handy (fig. 2.), that a ſingle man may ſtamp twenty thouſand planchets in one day: gold, ſilver, and copper planchets, are all of them coined with a mill, to which the coining ſquares (fig. 3.), commonly called dyes, are faſtened; that of the face under, in a ſquare box garniſhed with male and female ſcrews, to fix and keep it ſteady; and the other above, in a little box garniſhed with the ſame ſcrews, to faſten the coining ſquare. The planchet is laid flat on the ſquare of the effigy, which is dormant; and they immediately pull the bar of the mill by its cords, which cauſes the ſcrew ſet within it to turn. This enters into the female ſcrew, which is in the body of the mill, and turns with ſo much ſtrength that by puſhing the upper ſquare upon that of the effigy, the planchet, violently preſſed between both ſquares, receives the impreſſion of both at one pull, and in the twinkling of an eye.

The

Encyclopedia Britannica First Edition
pp 130-131 plate CXLIV (1768-1771)

The planchet thus ſtampt and coined, goes through a final examination of the mint wardens, from whoſe hands it goes into the world.

In the COINING *of Medals*, the proceſs is the ſame, in effect, with that of money; the principal difference conſiſting in this, that money having but a ſmall relievo, receives its impreſſion at a ſingle ſtroke of the engine; whereas for medals the height of their relievo makes it neceſſary that the ſtroke be repeated ſeveral times: to this end the piece is taken out from between the dyes, heated, and returned again; which proceſs, in medallions and large medals, is repeated fifteen or twenty times before the full impreſſion be given: care muſt be taken, every time the planchet is removed, to take off the ſuperfluous metal ſtretched beyond the circumference with a file. Medallions, and medals of high relievo, are uſually firſt caſt in ſand, by reaſon of the difficulty of ſtamping them in the preſs, where they are put only to perfect them; in regard the ſand does not leave them clear, ſmooth, and accurate enough. Therefore we may ſee that medals recieve their form and impreſſion by degrees, whereas money receives them all at once.

Britiſh COINAGE, both by the beauty of the engraving, and by the invention of the impreſſions on the edges, that admirable expedient for preventing the alteration of the ſpecies, is carried to the utmoſt perfection.

It was only in the reign of king William. III. that the hammer-money ceaſed to be current in England, where till then it was ſtruck in that manner, as in other nations. Before the hammer ſpecies was called in, the Engliſh money was in a wretched condition, having been filed and clipped by natives as well as foreigners, inſomuch that it was ſcarce left of half the value: the retrieving this diſtreſſed ſtate of the Engliſh money is looked upon as one of the glories of king William's reign.

The Britiſh coinage is now wholly performed in the Tower of London, where there is a corporation for it under the title of the *mint*. Formerly there were here, as there are ſtill in other countries, the rights of ſeinorage and braſſage: but ſince the eighteenth year of king Charles II. there is nothing taken either for the king or for the expences of coining; ſo that weight is returned for weight, to any perſon who carries their gold and ſilver to the Tower.

The ſpecies coined in Great Britain are eſteemed contraband goods, and not to be exported. All foreign ſpecies are allowed to be ſent out of the realm, as well as gold and ſilver in bars, ingots, duſt, &c.

Barbary COINAGE, particularly that of Fez and Tunis, is under no proper regulations as every goldſmith, Jew, or even private perſon, undertakes it at pleaſure; which practice renders their money exceeding bad, and their commerce very unſafe.

Muſcovite COINAGE. In Muſcovy there is no other coin ſtruck but ſilver, and that only in the cities of Muſcow, Novogrod, Twere, and Pleſkow, to which may be added Peterſburgh. The coinage of each of theſe cities is let out to farm, and makes part of the royal revenue.

Perſian COINAGE. All the money made in Perſia is ſtruck with a hammer, as is that of the reſt of Aſia; and the ſame may be underſtood of America, and the coaſts of Africa, and even Muſcovy: the king's duty, in Perſia, is ſeven and a half *per cent.* for all the moneys coined, which are lately reduced to ſilver and copper, there being no gold coin there except a kind of medals, at the acceſſion of a new ſophi.

Spaniſh COINAGE is eſteemed one of the leaſt perfect in Europe. It is ſettled at Seville and Segovia, the only cities where gold and ſilver are ſtruck.

COIRE, or, as the Germans call it, CHUR, a large and handſome town of Switzerland, and capital of the country of the Griſons, with a biſhop's ſee, whoſe prelate has the right of coining money. It is divided into two parts; the leaſt of which is of the Roman Catholic religion, and the greateſt of the Proteſtant. It is governed by its own laws, and ſeated in a plain, abounding in vineyards and game, on the river Pleſſure, half a mile from the Rhine. E. Long. 9. 27. N. Lat. 46. 50.

COITION, the intercourſe between male and female in the act of generation.

It is obſerved that frogs are forty days in the act of coition. Bartholine, &c. relate, that butterflies make 130 vibrations of the wings in one act of coition.

COIX, JOB'S-TEARS: A genus of the triandria order, belonging to the monœcia claſs of plants; and in the natural method ranking under the 4th order, *Gramina*. The male flowers grow in ſpikes remote from one another; the calyx is a biflorous, beardleſs glume. The calyx of the female is a biflorous glume; the corolla a beardleſs glume; the ſtyle bipartite; the ſeed covered with the calyx oſſified. Of this there is but one ſpecies, a native of the Archipelago iſlands, and frequently cultivated in Spain and Portugal, and alſo in the Weſt Indies. It is an annual plant, riſing from a fibrous root, with two or three jointed ſtalks, to the height of two feet, with ſingle, long, narrow leaves at each joint, reſembling thoſe of the reed; at the baſe of the leaves come out the ſpikes of flowers ſtanding on ſhort foot-ſtalks; the ſeeds greatly reſemble thoſe of gromwell; whence the plant has by ſome writers been called *lithoſpermum*. This plant may be propagated in Britain by ſeeds brought from Portugal, and ſown on a hot-bed; after which the young plants are to be removed into a warm border, and planted at the diſtance of two feet at leaſt from each other. They will require no other care than to be kept free from weeds. In Spain and Portugal the poor people grind the ſeeds of this plant, in times of ſcarcity, and make a coarſe kind of bread of them. The ſeeds are incloſed in ſmall capſules about the bigneſs of an Engliſh pea, and of different colours. Theſe are ſtrung upon ſilk, and uſed inſtead of bracelets by ſome of the poorer ſort in the Weſt Indies, but eſpecially by the negroes.

COKE, or COOKE (Sir Edward), lord chief juſtice of the king's bench in the reign of James I. was deſcended from an ancient family in Norfolk, and born at Milcham in 1549. When he was a ſtudent in the Inner-Temple, the firſt occaſion of his diſtinguiſhing himſelf was the ſtating the caſe of a cook belonging to the Temple ſo exactly, that all the houſe, who were puzzled with it, admired him and his pleading, and the whole bench took notice of him. After his marriage with a lady of great fortune, preferments flowed in upon him. The cities of Norwiſh and Coventry choſe him for their recorder; the county of Norfolk, for

3rd edition 1797 Same plate in 1st edition

COINING. Plate CXLIV.

Fig. 1.

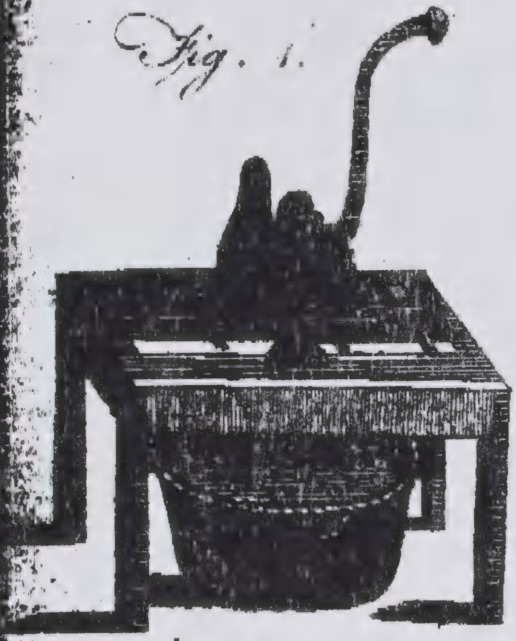


Fig. 2.

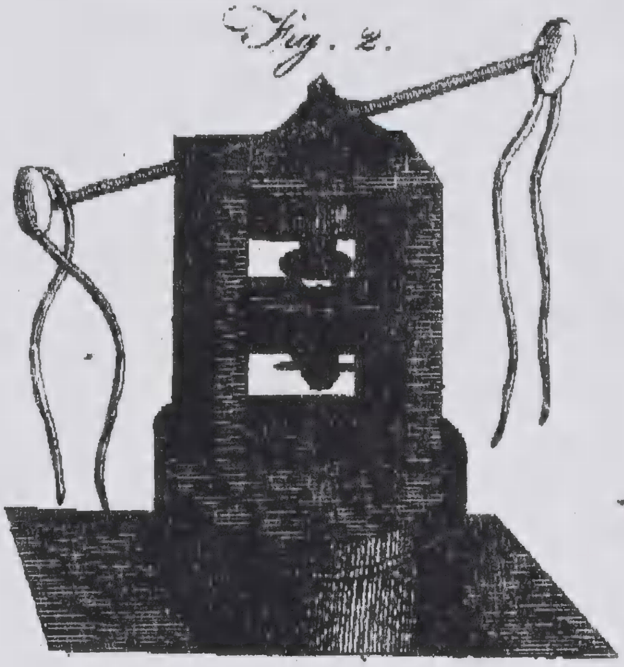
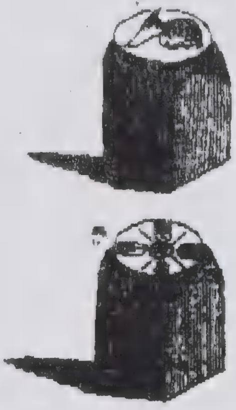
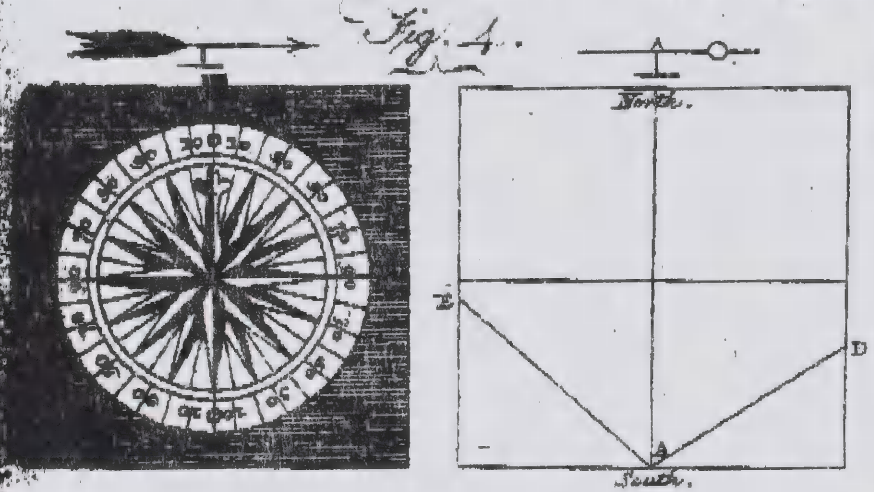


Fig. 3.



COMPASS.

Fig. 4.



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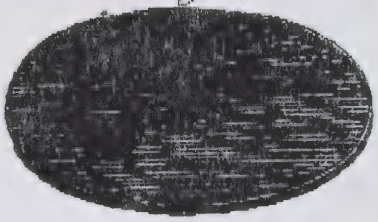

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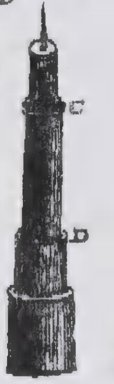
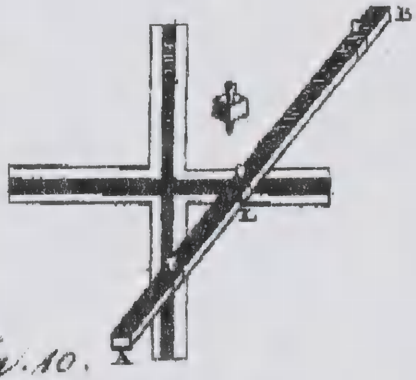


Fig. 9.



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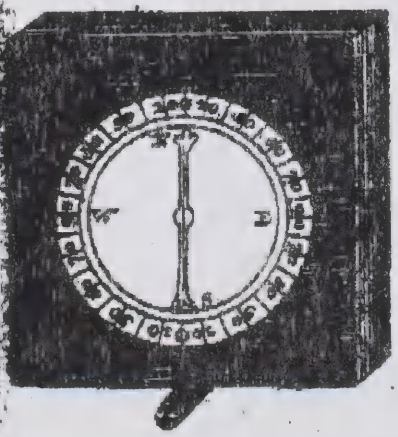


Fig. 6.

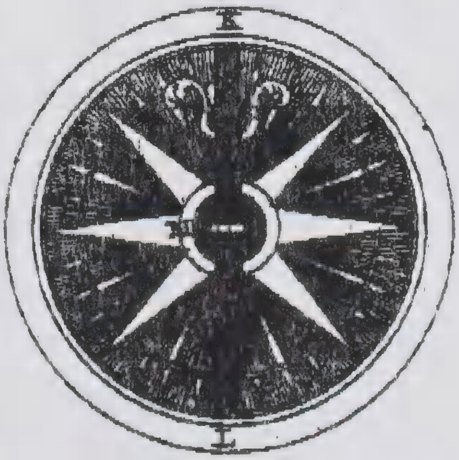
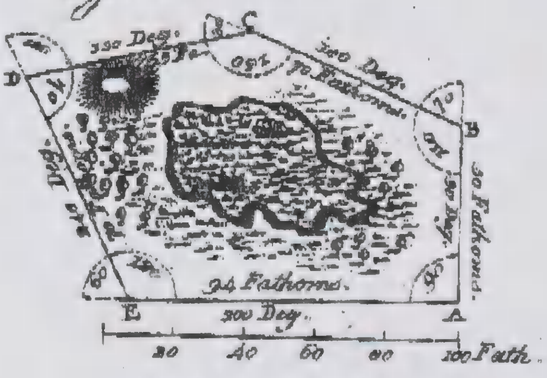


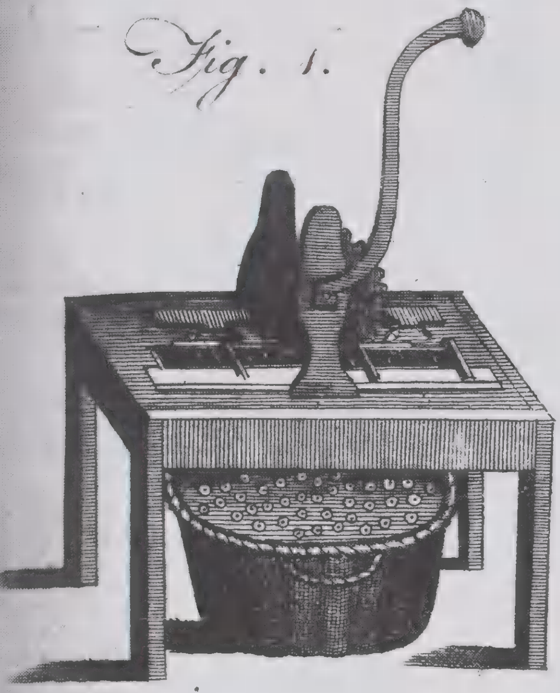
Fig. 10.



A. Bell Prin. Wal. Sculptor fecit

COINING. Plate CXLIV.

Fig. 1.



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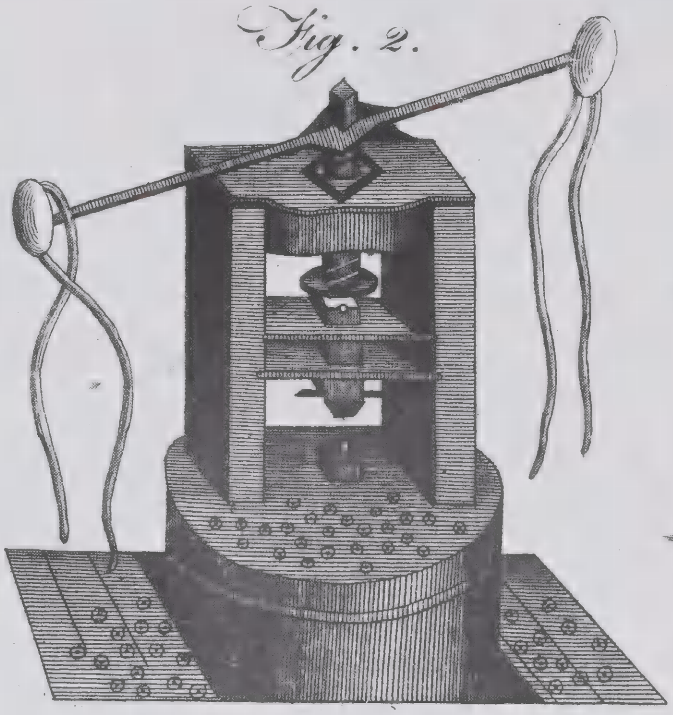

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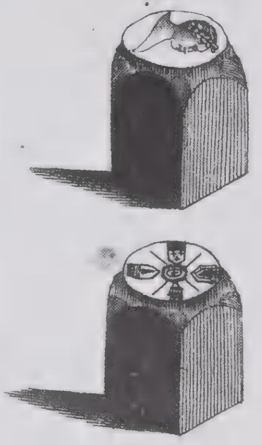

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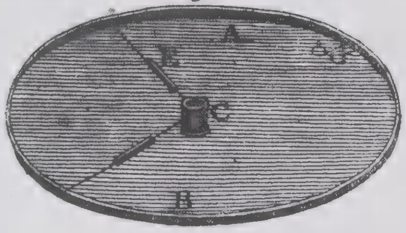
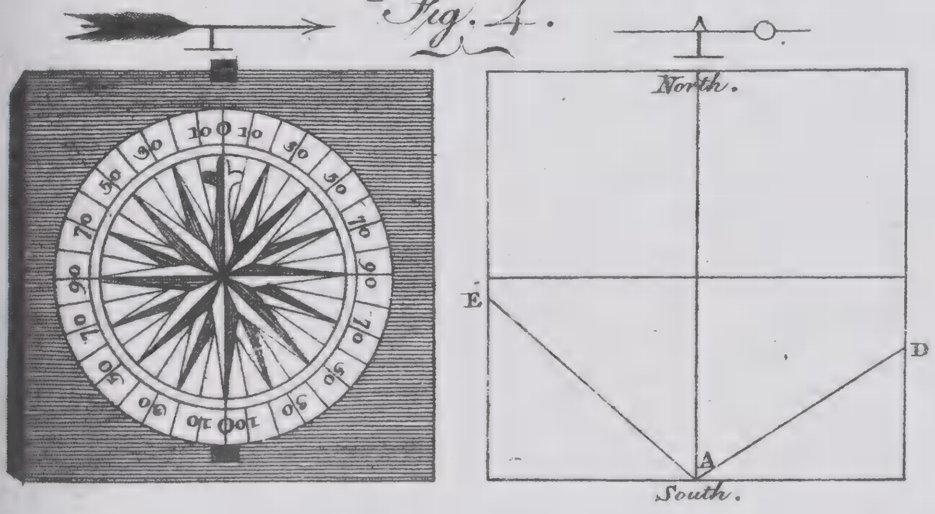


COMPASS.

Fig. 4.



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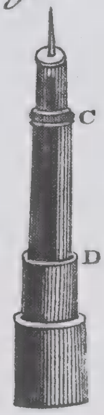

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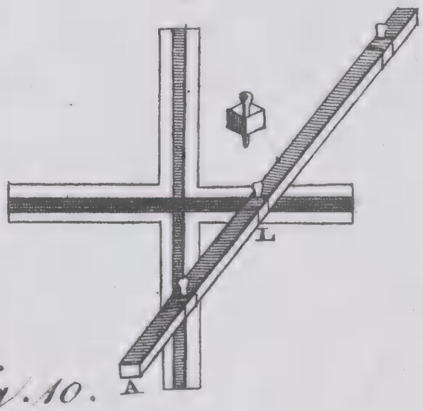

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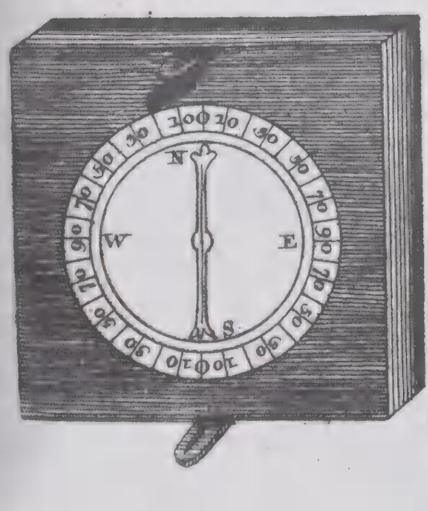

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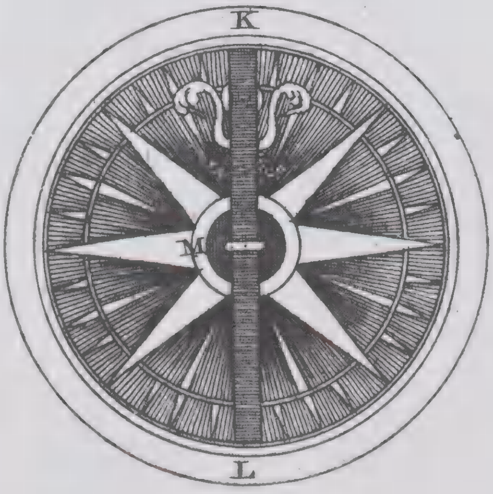
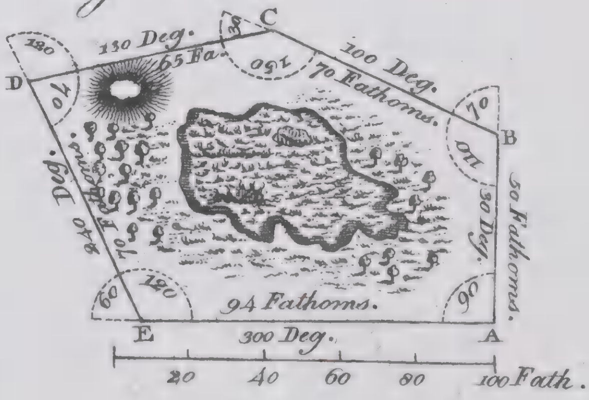


Fig. 10.



A. Bell Prin. Wal. Sculptor fecit.

SUPPLEMENT

TO THE

FOURTH, FIFTH, AND SIXTH EDITIONS

OF THE

ENCYCLOPÆDIA BRITANNICA.

WITH PRELIMINARY DISSERTATIONS

ON THE

HISTORY OF THE SCIENCES.

Illustrated by Engravings.

VOLUME THIRD.

EDINBURGH:
PRINTED FOR ARCHIBALD CONSTABLE AND COMPANY, EDINBURGH;
AND HURST, ROBINSON, AND COMPANY,
LONDON.

1824.

use for the interpolation the formula $\frac{a'}{a} = 10^{CD'} - 1$, C being about 2.9 for tubes between 1 inch and $\frac{1}{5}$th of an inch in diameter, and being elsewhere easily deduced from the depressions already known. For variations of the cohesive power, and of its measure r, we may suppose the whole of the numbers of the table to be altered in the proportion of the supposed alteration of $\sqrt{r}$, and the change produced by restoring the diameter to its former dimensions may then be calculated like any other interpolation. There is also a more comprehensive formula, which seems to express the depression in tubes of all sizes with great accuracy; it is this, $a = \frac{.015}{D + 48 D^{3.492 + 3.26 D}}$: and it might even be possible to shorten the original calculation by a comparison of the series with the expansion of this empirical formula, if it were of any further importance to facilitate the mode of computation. But for all practical purposes, it will be sufficient to collect the results already obtained into a comparative table, arranged in chronological order: and it is remarkable, that they are all comprehended, without any material exception, between the two values assigned to each as near the truth in Dr Young's first table, the mean of those values never differing a thousandth of an inch from the result of the more correct calculation; while the error of Lord Charles Cavendish's experiments, notwithstanding their general accuracy, sometimes amounts to nearly one hundredth.

Table of the Depression of Mercury in Glass Tubes.

DIAMETER.	CENTRAL DEPRESSION.											MARGINAL DEPRESSION.	DIFFERENCE.	DIAMETER.
	Observed by Ld Cavendish.	Dr Young, Phil. Trans. 1805.		Laplace, 1806.	Dr Young, 1807.	Nicholson's Journal, 1809.		Laplace, 1810.	Correct Calculation.		Empirical Formula.	Nich. 1809.		
Inches.		Diagr.	Form.			$r = .005$ $s = .750$	$r = .0051$ $s = .7553$		$r = .005$ $s = .750$	$r = .005038$ $s = .729$		$r = .005$ $s = .750$		
1.00						.00031	.00032		.0003073	.000307	.00031			1.00
.90						.00060	.00062				.00059			.90
.80						.00115	.00118	.00128	.001147	.001144	.00112			.80
.70						.00220	.00224	.00244			.00220			.70
.60	.005	.005		.0038	.0045	.00411	.00416	.00462	.004160	.04128	.00421	.0637	.0596	.60
.50	.007	.007	.008		.0074	.00799	.00805	.00868			.00799	.0676	.0596	.50
.45					.0100	.01100	.01106	.01174			.01099	.0690	.0580	.45
.40	.015	.012	.017	.0136	.0139	.01516	.01522	.01591	.01503	.01486	.01495	.0714	.0562	.40
.35	.025	.017	.024		.0196	.02093	.02098	.02165			.02082	.0745	.0536	.35
.30	.036	.027	.033		.0280	.02902	.02906	.02965			.02881	.0787	.0497	.30
.25	.050	.038	.044		.0404	.04064	.04067	.04117			.04025	.0850	.0444	.25
.20	.067	.056	.061		.0589	.05800	.05802	.05798	.05776	.05696	.05771	.0966	.0386	.20
.15	.092	.085	.088		.0880	.08620	.08621	.08538			.08568	.1171	0309	.15
.10	.140	.140	.140		.1424	.14027	.14027	.13940	.14004	.13726	.14002	.1619	.0216	.10
.05					.2964	.29497	.29497				.29502	.3060	.0110	.05

(F. O.)

COINAGE.

Under this head it will be proper to give a brief account of the constitution of the Royal Mint, as well as of the different processes which come under the general term *Coinage*; for all these processes are conducted under various checks emanating from the constitution which the legislature has thought proper to give this Royal Establishment.

The Royal Mint attained its constitution of superior officers in the 18th year of the reign of Edward II., and, with very few alterations, continued as then established till the year 1815. Of the alterations in this latter year we shall have occasion to speak hereafter.

Ancient Establishment of the Mint.

Edward appointed a Master, Warden, and Comptroller, King's and Master's Assay Master, and King's Clerk, besides several inferior officers, whose duties will be mentioned hereafter. Previous to this period, we have very little information as to the system of coinage pursued at the various mints which the kings of England had throughout their dominions. The Rev. Roger Rudding, in his valuable and laborious *Annals of the Coinage of Britain and its Dependencies*, gives it as his opinion, that the moneyers were in very early ages the only officers employed in the fabrication of the money. On the early Anglo-Saxon coins are found, besides the names of the monarchs, those of other persons, who are with great probability conjectured to have been the moneyers, because on the later Anglo-Saxon money the names of those officers frequently occur, with the addition of their title of office. From the circumstance of their names being inscribed on the coins, it is reasonable to conclude, that they were responsible for the integrity of the money, and that likewise they were the principal officers of the mint, because inferior officers would have given security to their superiors, whose names would have appeared on the money, as a pledge to the sovereign that it was duly executed. The silence also of the Anglo-Saxon laws, and of *Doomsday Book*, as to other officers of the mint, whilst they so frequently mention the moneyers, greatly corroborates the opinion, that they were the only persons employed in the Anglo-Saxon and early Anglo-Norman mints, except, perhaps, occasional labourers; and it is observable, that, when in the reign of Henry I. the money was so much corrupted as to call for a sentence of the most exemplary severity on the offenders, the punishment is said to have been inflicted upon moneyers only, without the least notice of any other officer. This was also the case upon a similar occasion in the reign of Henry II.

Mr Rudding is unable to determine the exact period when it became necessary to place some permanent superintending authority in the mint to prevent the bad practices of the moneyers; but it is probable, he says, that such an officer was appointed between the 26th of Henry II., when the moneyers alone were punished for the adulteration of the money, and the 3d of Richard I., when Henry de Cornhill accounted for the profits of the cambium of all England, except Winchester.

It is not improbable that this first warden of the mint was appointed for the purpose of collecting the revenue arising from the seignorage charged upon coinage of bullion.

The object of the warden's appointment might also extend to the inspection of the fabrication of the money, with a view to prevent the master and his moneyers, or the moneyers alone, from taking any undue advantage of the king, or the public, by the adulteration of the coin. The most important officer, however, upon the establishment of the mint, with a view to the maintenance of the standard purity of the coin, is the king's assay master: and there are persons mentioned as holding this office in the 6th of Henry III. As this officer had the assaying of all the bullion after melting for coinage, and after it was coined, it is obvious that the very existence of the credit and honour of the mint and sovereign depended upon the duties he had to perform; and such an officer probably existed from the earliest period of the fabrication of money, though our records do not accurately define the precise date of his appointment.

The next officer of importance in the mint is the comptroller; and the first whom Mr Rudding's researches have discovered, held the office between 5th and 15th of Edward II. His duty, distinct from that of the other officers of the mint, is to make out annually a roll, called usually the comptroll or comptrollment roll, containing an account of all the gold and silver coined, and to deliver it on oath before one of the Barons of the Exchequer. It is always written upon parchment, and forms a permanent record of the coinages of the mint.

The king's clerk and clerk of the papers is the next check officer upon the establishment; as king's clerk, he acts as a check upon the whole process of the coinage, the same as the warden and comptroller; as clerk of the papers, he keeps a book of record of the transactions of the mint. Of the creation of this office we have not been able to find any record.

These are the principal check officers of the mint, and, no doubt, were appointed as mutual checks upon each other's integrity, and to watch over the interests of the king and other importers of bullion into the mint.

There is another officer upon the establishment, whose duties are important, but of whose origin and appointment we have not been able to find any notice. His title is, the master's assay master, and his duty consists in assaying every ingot of gold and silver brought to the mint for coinage; and upon his integrity the master and worker relies that no bullion shall be received into the office for coinage, but what is conformable to the standard of the realm.

Mr Rudding remarks, Vol. III. p. 1. that, at a very early period of the history of Britain, when the communication between its different parts was extremely imperfect, it became necessary to establish mints and exchanges, not only in the chief city, but also in various other places, for the purpose of supplying the neighbouring districts with money to carry on their commerce. To this necessity alone such establishments are to be ascribed; and accordingly we find, that, by degrees, as the communication opened, the subordinate mints and exchanges sunk into disuse, and one fixed in the metropolis was found to be amply sufficient for the supply of the whole kingdom.

Athelstan appears to have been the first monarch who enacted any regulations for the government of the mints. In his laws, which were promulgated about the year 928, he provided that one sort of coin only should be current throughout the kingdom, and granted to various towns, by name, a number of moneyers proportionate to their size and consequence, and to all boroughs of inferior rank one moneyer each.

These mints were under the control of that within the Tower of London, from which, as paramount, the dies were issued; and for which the moneyers paid a regular fee upon every alteration of the coins. They also paid an annual rent, which, in the city of Lincoln, amounted to L.75 (according to the statement of *Doomsday Book*), a very considerable sum at that time. The rents of the other mints were, however, much inferior to this.

To increase the facility of distributing the coins made at these mints, Exchanges were appointed in various places from whence the new coins were issued, and in which bullion was purchased for the supply of the mint; and it appears that our monarchs claimed the exclusive privilege of purchasing bullion, and appointed proper officers, to whom they delegated that branch of their prerogative.

It appears to have been the duty of these officers, not only to exchange the current coins of one metal for those of another, but also to receive wrought plate and bullion, and foreign coins, according to their fineness respectively; and as the exportation of the coins of the realm was prohibited, they furnished persons going out of the kingdom with foreign coins, in exchange for English, and also supplied merchants and strangers coming into the kingdom with English coins in exchange for foreign. These exchanges of coin were regulated by a table, which was hung up in the exchanger's office.

This office has ceased to exist since the reign of

Charles I. Henry Earl of Holland was the last keeper of the exchanges between England and Ireland.

Besides the officers mentioned, there was another of great importance in early times, who bore the title of Cuneator. Mr Rudding mentions this officer as being hereditary, and, as far as he had discovered, the only one in the mint that was so. The engravers of the dies seem to have been appointed by him, and to have been under his immediate cognizance. By him they were presented to the Barons of Exchequer, before whom they took the usual oath of office; and it was probably his duty to see that all the dies (as well those which were used in the paramount mint, in the Tower of London, as those which were issued from thence to the subordinate mints) were of the same type. This was no doubt a circumstance of great moment, when so many mints were allowed to be worked in various parts of the kingdom. When these mints were abolished, and the mint in the Tower became the only source from whence coins were derived, the office sunk into disuse. By right of office, this officer claimed the old and broken dies as his fee. An officer of a similar kind exists in the mint at this day, who is called clerk of the irons, whose duty it is to superintend the manufacture of the dies for coinage; but he has no power to appoint the engravers of the dies.

In the early history of the mint, as at present, the master of the mint fabricated the coins at certain charges *per* pound weight. He had his regular establishment of melters and moneyers, to whom he paid certain rates for melting and making the monies, reserving for himself a certain fee for his trouble and responsibility. For, in all his engagements with the Crown, the master had to bear all waste and charges arising in and out of the coinage of gold and silver. Mr Rudding mentions that, in the 10th of Edward III. the workmen of the mint of London petitioned the king for an increase of their allowance for coinage; alleging that they were at that time at greater expence, and bestowed more labour, in forming the monies, than had been usual in former times, so that they could not maintain and continue such expence and labour, unless their allowance was increased.

The king being willing to grant their petition if just, commanded John de Wyndesore, warden of the mints of London and Canterbury, together with Lapone Roger, and others experienced in such matters, to inquire whether the allowance was sufficient; and if not, to determine what addition should be made; and they were ordered to make their report in Chancery, under their seals, without delay.

A warrant was in consequence issued, and Lapone and Roger Rikeman, exchangers of London, and Stephen Boke, having been examined on oath by the warden, the following report was made: That, having inquired diligently respecting the necessary expences of the master of the mint and the workmen, viz. of alloy, clay, and salt, and other things used in the making of new money, and also of the expences occasioned by the waste arising from the whitening of the halfpennies and farthings, on account of the increase of the alloy, and from the hardening of the metal of the said coins in working and coining—they were of opinion that the work could not be carried on without an increase of 3d. for each pound at the least; and with that the workmen ought reasonably to be contented. Then, whereas of old they received for all costs, colour, &c. for a pound of halfpennies, 7½d., and for a pound of farthings, 9½d., they would receive for the former 10½d., and for the latter 12½d., so that the master should have of increase 2d., and the workmen 1d.

It was the duty of the warden to take an account of all the bullion of gold and silver entrusted to the master and worker of the mint to be coined; and in this duty he was aided by the comptroller and king's clerk, who in their respective capacities kept books of entries of the receipt of bullion, and its delivery in coin to those who brought the bullion for that purpose. Besides those duties, these check officers had the superintendence of the different processes throughw hich the bullion had to pass, from the assay of the ingot to the delivery of the coin to the importers; and it is more than probable, that in the infancy of the mint, and when the demand for coin was very limited, the whole processes of the coinage were conducted in one apartment; that the master, warden, comptroller, and other principal officers of the mint, accompanied the sovereign from place to place in his dominions, and actually superintended the fabrication of the coin at the mints of the towns where he sojourned. The progressive civilization of the country, the increasing demand for money, and the more permanent residence of the monarchs in London, give the mint of the Tower a predominancy over all others; and these circumstances very probably called for the appointment of other check officers, who are now upon the mint establishment; such as the surveyor of the meltings, whose duties are to superintend the melting of the pots of gold and silver, and to weigh the proportion of fine gold or alloy which may be necessary to produce the standard of the money; to take samples of all pots melted, and take them to the king's assay-master, for him to ascertain if the standard has been adhered to by the melter; and to lock up the said pots, of which samples have been taken, in the melter's strong-hold, of which he has one key, and the melter another, and there to retain them until the king's assay-master has declared that they are of the proper standard. In the infancy of the mint, the duties of this officer were probably performed in the presence of the warden, comptroller, and king's clerk; but the increase of duties in the mint office, in the receipt of bullion and delivering coin, probably rendered it necessary to relieve the principal officers from these duties, as well as from those of another officer, called the surveyor of the money-presses, whose duties consist in seeing that good dies are used, and clean money made in the coining room.

When these and other officers were in full power, operating as checks upon the coinage, and, consequently, upon the master and worker, they received their salary and fees from the warden, as chief of the check branch of the establishment.

The expenditure for the repairs of buildings, officers' houses, &c. &c. was also paid by the warden of the mint; and his authority for doing so was by the mint indenture, in which these duties are detailed. "And our said Sovereign Lord the King doth will and command, that the warden or wardens of the mint, for the time being, shall content and pay to the officers and ministers aforesaid, such stipends and wages, and such diet, as in schedule limited and appointed, in manner and form, and during such term as in the same expressed; and that thereof he and they shall have due allowance and defalcation upon his or their accounts. And that the said warden or wardens shall make his or their accounts yearly, as well of all and every of his or their receipts, as of his or their payments, and other charges, before the auditors of the mint for the time being, unless it shall please his Majesty otherwise to appoint the same; in which account the same auditors, or others to be appointed by his said Majesty to take the said accounts, shall make unto the said warden or wardens full allowance, defalcation, and discharge, as well for all such sum and sums of money as he or they shall duly prove to have been paid or disbursed for officers' fees and wages, and diet for the said officers, as for any other necessary charges to be employed in and about the making of the said monies, or the repairing of the said offices and houses, necessarily to be employed in the said service, under the avouchment of the said master and comptroller and assay-master, or any two of them, whereof the said master is to be one; and the said accounts so to be made by the said auditors, or by any other of his Majesty's special appointment for the same, being stated, and his debts determined, and his said accounts fully answered to his Majesty, the said warden or wardens, upon his or their suit to the Lord Chancellor, or Lord Keeper of the Great Seal, or Commissioners of the Great Seal, shall have letters patent of his said Majesty under the great seal, to be made on his or their acquittance, without fee therefor paying; for the making of which said letters patent, these presents shall be a sufficient warrant and discharge to the said Lord Chancellor, or Lord Keeper, or Lords Commissioners for the custody of the Great Seal, for the time being, without any further or special warrant to be sued out for the same."

Notwithstanding the number of the checks upon the coinage of our money, its history gives us the most undeniable proofs of their inefficiency, when the arbitrary will of the sovereign was allowed to put all law and justice aside. However much we may admire the precautions used by our ancestors in the formation of the constitution of the mint, we have still the painful recollection (though its forms and regulations have existed since the reign of Edward III.) that they could not prevent a Henry VIII. from disgracing his reign by, perhaps, the most wanton debasement of the currency, that was ever, in a similar period of time, practised in any country in the world. The same ignorance and injustice disgraced the beginning of the reign of his son, Edward VI., but the subsequent acts, even of his short reign, were a good apology for the impolicy of his measures, and the severest censure upon the injustice of his father's acts regarding the currency. The short reign of Edward VI. prevented that thorough reformation in the currency which the wisdom of his measures began, and which was perfected in the long and glorious reign of his successor, Elizabeth.

Expences of the Coinage in early times.

In the early history of our coinage, its expences were paid by a duty or seignorage upon the money coined; and, besides these expences, a certain duty was retained for the sovereign, and was one of the sources of his revenue. The amount of this duty was regulated entirely by the will of the sovereign, and without any regard to the principle by which it was assessed; it varied in different reigns, and was probably, in a great measure, regulated by the necessities of the sovereign for the time being. The mere charge of coinage, as Mr Rudding justly remarks, is probably as ancient as the invention of coined money; because it would soon be discovered, that the sovereign, after having turned his bullion into coins, for the benefit of his subjects, was no richer than before. It is probable, however, that the deduction did not remain long at the simple expence of coinage, but was soon made a profitable and easily collected source of revenue. In fact, the prerogative of coinage being exclusively the sovereign's, made it a certain source of revenue. In the earliest mint accounts which Mr Rudding has met with, viz. one of the 6th of Henry III., the profit upon the coinage was 6d. in the pound. This appears, says Mr Rudding, from the entries, under that year, of bullion coined in the mint at Canterbury, when the profit upon L. 3898, 4d. is stated to be L. 97, 9s., which is exactly 6d. in the pound. Of that sum the king had L. 60, 18s. $3\frac{1}{2}$d., and the archbishop L. 36, 10s. $10\frac{1}{2}$d. (these totals do not precisely agree, as is frequently the case when sums are stated in Roman numerals); the whole sum of L. 97, 9s. is stated to be the amount of *exitus lucri*, that is, we presume, the clear profit, after all the expences were deducted. And this will agree with the seignorage which was taken in the 28th year of Edward I., amounting to 1s. $2\frac{1}{2}$d. upon every pound, out of which the master had $5\frac{1}{2}$d. for all expences, and there remained 9d. clear profit to the king.

As this latter date is about seventy-eight years subsequent to the former, it is not improbable that the seignorage had been raised in that time, in the proportion of nine to six.

Regulations introduced by Charles II.

A seignorage continued to be charged upon the coinage of both gold and silver until the reign of Charles II., who, after his restoration, took the expences of the coinage of the money of the Commonwealth upon himself.

In September 1661, in the 13th year of his reign, a proclamation was issued, declaring, that the gold and silver coined during the period of the Commonwealth should not be current after the last day of November in the same year. At the same time it declared, "that such of our subjects in whose hands these moneys shall be found after the last day of November next ensuing, may not suffer too great damage or prejudice thereby, we are pleased further to declare, that all and every person and persons who shall bring any gold or silver coyn of the stamps and inscriptions aforesaid into our mint in the Tower of London, shall there receive the like quantity of lawful and current moneys, weight for weight, allowing only for the coinage."

On the 7th day of December in the same year, another proclamation was issued, declaring the money of the Commonwealth current only in payment of taxes, &c. to his Majesty, and to continue so to the 1st day of May next ensuing. The object of this proclamation was to bring as much of this money into his Majesty's exchequer as possible, for the purpose of recoining it, It is in this proclamation that the king takes the expence of coinage upon himself: "We being willing," it says, "for the ease of our subjects, to take the charge of the coinage thereof upon ourself."

It was in these proclamations that the system began of charging the government with the expences of the coinage of this country. The merchants and others, who were interested in saving both the duty and the expence of coinage, took advantage of the last mentioned proclamation, and represented to the king and his council by memorials, the great advantage which trade and the country at large would derive from the sovereign taking upon himself, as a permanent charge, the expence of coinage; they also represented that a great increase would take place in the quantity of money, if coined free of any charge to the importers of bullion. As these representations were irreconcilable with the just principles of public wealth,—as they were brought forward by persons ignorant of the consequences which would attend their execution, we much doubt whether they produced the effect which the interested individuals were so desirous of obtaining. In the 18th year of the same reign, an act was passed, exempting, in future, the importers of bullion from all charge of coinage, and which has continued till the present day.

As the science of political economy was very little understood in the period here mentioned, it is not to be wondered at, that the voices of a few interested individuals could procure the passing of an act so plausible. There can be no doubt but Charles and his council were swayed by the apparent knowledge which those individuals evinced in the practical details of business, and trusted to their representations being correct; but a practical knowledge of business, founded upon mistaken principles, must lead to erroneous conclusions; and it is easy to prove, that Charles and his council were imposed upon by these practical men.

This country would, at least, have been equally rich, and the quantity of coined money in no degree diminished, if the charge of workmanship had been continued upon the coinage; for the quantity of money in a country that possesses no mines of its own, must be regulated by the produce of its land and labour,—upon the quantity of exchangeable commodities; and as the quantity of exchangeable commodities increased, so would the quantity of money be increased, except in so far as good husbandry, or increased value of the precious metals could make it be spared to circulate them. As the charge of coinage could have no effect in diminishing the quantity of the precious metals that would be imported into the country; the portion of this bullion that would be brought to the mint to be coined, would depend upon the demand for coin; and this demand would regulate the profits, which the individuals, who did coin, could make by it, either in trading with it themselves, or by lending it to others.

If there were a charge for coinage, there would, strictly speaking, be a less quantity of bullion imported, because we should have a less quantity of money than we now have; but that money would be *more* valuable. A guinea or 5 dwts. 9½ grs. would be more valuable than 5 dwts. 9½ grs. of gold bullion, and consequently fewer of them would be requisite for the circulation of the same amount of commodities. The effect would, therefore, be to increase the quantity of commodities, and to lessen the quantity of bullion or coin.

Question as to the effects of a Seignorage.

The policy of Charles's measures with respect to the coinage, have been questioned by various writers. And, in fact, the principle of a seignorage, so often agitated, has never been satisfactorily settled. Lord Liverpool, in his excellent *Letter to the King upon the Coins of the Realm*, conceives that a seignorage upon our gold coin, which is the standard money of our country, would necessarily cause that measure of property to be imperfect. His Lordship has not favoured us with any account of the nature of the imperfection that would have been created by charging a seignorage upon our gold coins. The only imperfection that could be called into existence we apprehend, by charging the expence of coinage upon gold, would be the alteration which it would make in its value. L. 100 of gold coin, chargeable with an expence of coinage (say of 1½ *per cent.*), would, while the king preserved the monopoly of coinage, be more valuable than its weight of uncoined gold; and consequently would alter the state of debtor and creditor, as well as require the Government to pay her annuitants, and other branches of her expenditure, in a currency more valuable than before the charge of seignorage was imposed.

Let us, for example, suppose that we had only coins of gold in this country, and that a seignorage to the amount of the expences incurred in their manufacture was imposed by the legislature, say of 1½ *per cent.*, it must be evident that a L. 100 of such coins would be more valuable than their weight in bullion of the same purity, by the expence of the coinage. Every L. 100 of such gold currency, therefore, would purchase not only its weight of bullion, but 1½ *per cent.* more, as the expence of converting such bullion into coin. As no legal coin can be obtained but where this charge is made, the market-price of gold would thus be 1½ *per cent.* under its mint price. If the seignorage exceeded the expences of the coinage, so as to afford a profit to the illegal coiner, supposing him to coin money of the legal standard in weight and fineness, then would the value of the currency be reduced by such illegal additions to its quantity; the market price of bullion would approach to its mint price, but would fall short of it by the real expences of the coinage, and would thus destroy the profits of the illegal coiner It will also follow, that a L. 100 of such currency would purchase a greater quantity of any commodity than its weight of bullion of the same purity would do, and that by the expences of the coinage, or 1½ *per cent.* By the imposition of a seignorage, therefore, the price of bullion and commodities would experience a fall, limited however by the real expences of the coinage, no laws having yet been devised to prevent illegal additions to the currency. We should not however apprehend that the coins fabricated under this system would in any degree be imperfect: on the contrary, we think that a considerable national advantage might have been the result, had such a principle been adopted at the British mint. As the value of the coins would be increased, so would their quantity have been diminished. A smaller amount of currency would have circulated the same quantity of commodities. The gold thus relieved from the channel of circulation, would, in the hands of individuals, have become capital, the nation deriving all the advantages of its reproduction, with a profit.

The second objection of Lord Liverpool, if well-founded, would certainly render it impolitic in the legislature to enact a seignorage upon the coins constituting the principal measure of property, either as a present or primary principle in the government of the mint. "The merchants of foreign nations, who may have any commercial intercourse with this country, estimate the value of our coins only according to the intrinsic value of the metal that is in them; so that the British merchant would, in such case, be forced to pay in his exchanges, a compensation for any defect which might be in these coins; and he must necessarily either raise the price of all merchandise and manufactures sold to foreign nations in proportion, or submit to this loss."

If the imposition of a seignorage had no effect in augmenting the value of the coins, Lord Liverpool's objection would be correct; but we have already stated, that the coins acquire a value proportionate to the expence of the coinage; the natural limit of a seignorage where the laws cannot prevent illegal additions to the amount of the currency. If so, the relation between the foreign and British merchant would in no degree be changed; they would continue to buy and sell, with the same advantages as before the seignorage was imposed:—there would, it is true, be some differences in price, but not to affect the relative interests of the parties. For example, if a seignorage of 1½ *per cent.* was imposed upon the currency of England, while that of Hamburgh remained without alteration, it will be evident, from what has already been stated, that a fall in the price of British commodities would take place in consequence; but this fall in prices would not be confined to British commodities alone; the foreign commodities brought to the English market must necessarily undergo the same reduction; but the foreign merchant would not be subject to any loss in consequence of this fall in the price of his commodities; for the reduction in the price of English goods enables him to buy as much cheaper as will compensate for the diminution in the price of his foreign wares: neither would the British merchant be subject to any loss by the fall in pri[illegible], he being enabled to buy foreign commodities so much cheaper as to compensate for the reduction in the price of English commodities.

The exchanges with foreign nations would be regulated by the same principle. A merchant in London, for example, wanting to remit L. 100 to his correspondent in Hamburgh, to discharge a debt which he owed there, would with his L. 100 of English currency, augmented of 1½ *per cent.* in value by a seignorage, buy upon the London Exchange a bill upon Hamburgh, entitling him to a quantity of Hamburgh currency equal in value to L. 101, 10s.—thus would bills upon Hamburgh be said in the London market to be at a discount 1½ *per cent.* But England would not gain by this discount upon Hamburgh bills; for, let us suppose that a merchant in Hamburgh wishes to discharge a debt in London of L. 100, all bills on London, sold in Hamburgh, will, upon the same principle, be sold at a premium equal to the increased value of the currency in England, to which these bills entitle the holders of them.

As a nation cannot permanently import to a greater amount than it exports, the holders of bills in London upon Hamburgh, cannot permanently exceed the holders of the bills in Hamburgh upon London, so that the discount on Hamburgh bills in the one case, and the premium on London bills in the other, will necessarily balance each other; so that neither party, if we are correct in our argument, would lose or gain, as far as related to the exchange by the imposition of a seignorage upon the British currency.

The third objection of Lord Liverpool to a seignorage upon the gold currency of England is, "That no such charge of fabrication has taken place at the British mint for nearly a century and a half past; and, if it were now to be taken, the weight of the new gold coins must be diminished to pay for this fabrication."

It does not necessarily follow, that a charge for the fabrication of our gold coins should diminish their weight to pay for such fabrication. If the expence of coining L. 100 of gold currency at the Royal Mint was L 1, 10s., the individual bringing the bullion to the mint, having this charge to defray, would not sell his L. 100 in coin for its weight in bullion; the value of the coin being augmented by the value of the workmanship, he would readily command a quantity of gold bullion more than its weight by the expence of the coinage, or 1½ *per cent.*, as has been already stated. This mode would render any change in the weight of the coin unnecessary.

Lord Liverpool's last objection is, "That these new gold coins would either differ in weight from those now in currency, or, to prevent this evil, the whole of our present gold coins must be taken out of circulation, brought to the mint, and be recoined."

If we are correct in our answer to his Lordship's third objection, the last one will necessarily fall to the ground. All the advantages of a seignorage may be obtained, without such seignorage being deducted from the weight of the coins.

From the arguments we have adduced, we should be justified, we apprehend, in approving of the principle of a seignorage, even upon the coins which constitute the principal measure of property, provided it did not exceed the mere expence of the coinage of such coins; for where a seignorage is charged, there is a tendency, as we have already noticed, to a fluctuation in the value of that currency,—an evil which should be avoided as much as possible. Where an extensive paper currency is used, as in England, this evil is considerably increased, even though the issuers of it are liable to pay it in specie on the demand of the holders; still both their notes and the coin might be depreciated to the full extent of the seignorage, before the check which limits the circulation of paper could operate. If the seignorage on our gold coin were 5 *per cent.*, for example, the currency, by an abundant issue of bank-notes, might be really depreciated 5 *per cent.* before it would be the interest of the holders to demand coin for the purpose of melting it into bullion,—the legal check to restore it to its proper value. If the seignorage amounted only to the mere expence of coinage, which is about 10s. *per cent.*, that would be the whole fluctuation in the value of our legal currency, even though bank-notes, payable on demand, formed the most considerable portion of it.

When Charles II. annulled the law for charging a seignorage upon our coins, he must have caused that alteration in the value of property which we here state as the *reason* why we cannot recur to it again, consistently with our national honour. And the late act respecting coinage, which allows a seignorage to be charged upon silver of 4d. *per* oz., but which directs that no charge whatever should be made on gold, it being the standard of property, is therefore a wise measure; as it preserves the integrity of that standard which has existed for upwards of a century, and by which the value of all property has been regulated.

If a seignorage, therefore, is ever charged, it should be from the first introduction of coined money in a state, and ought never to fluctuate in amount, as was anciently the case in this country; because such fluctuations must cause as frequent fluctuations in the value of property, an evil which cannot be too carefully avoided.

Improvements in the Machinery during the Reign of Charles II.

The next important event in the history of the mint, was the introduction of the mill and screw, which took place soon after the restoration of Charles II. Previous to his reign, the money in circulation was made by forging or hammering slips of gold and silver to the proper degree of thickness, then cutting a square from the slip, which was afterwards rounded and adjusted to the weight of the money to be made; the blank pieces of money were then placed between two dies, containing the design of the coin, and the upper one was struck with a hammer. This money was necessarily imperfect, from the difficulty of placing the two dies exactly over each other when the blank piece was between them, as well as from the improbability of a man being able to strike a blow with such force as to make all parts of the impression equally perfect.

The mill or press was first introduced from France into this country in the reign of Queen Elizabeth, but after a few years use was abandoned, as too expensive, and the hammer coinage resumed.

The coining press or mill is of French origin, and is generally ascribed to Antoine Brucher, an engraver, who in 1553 first tried it in the French King's (Henry II.) palace at Paris, for the coining of counters. It continued in use till 1585, in the reign of Henry III., when it was laid aside, on account of its being also more expensive than the hammer coinage. The machine remained in disuse until 1623, when Briot, a French artist, who was unable to persuade the French government to adopt it again, came to England, where it was immediately put in practice under Briot's direction, who was appointed chief engraver of the mint.

Like many other new inventions, it was sometimes used, then laid aside, and the hammer resumed for about 40 years. In the year 1662, the mill and screw were completely established in the English mint, as it had been by the French in the year 1645. The great improvement which took place in the form and impression of the coins struck by this new invention, gave them a decided superiority over the hammer money; and the excellent and truly philosophical improvements of the late Mr Boulton, which we shall hereafter describe, have placed the process of coining upon a basis so firm, and so decidedly superior, both in facility and economy, that we have no fear of returning to the ancient and less perfect mode of fabricating our money.

Recoinage of Silver in King William's Reign.

The next important feature in the history of our mint, was the extensive silver recoinage of King William, which amounted to upwards of L.7,000,000 Sterling. It was executed at several country mints, besides the mint in the Tower of London. The principle upon which this recoinage was executed, was a subject of great controversy, and occupied the talents of Mr Locke, Mr Lowndes, and others. Mr Lowndes wished to execute the coinage at a rate *per* oz. conformable to the market price of silver; overlooking, at the same time, that the market price exceeding its mint price, arose from the deficiency in the weight of those coins by which silver, as well as all other commodities, was bought and sold. Mr Locke, with that acuteness for which he was so justly esteemed, contended that, if 5s. 2d. of the coin weighed an oz. that would necessarily be the market price of silver; and that its high price arose from 6s. 4d. of the then currency containing no more than an oz. of standard silver. Consequently, if the coinage was executed at a rate higher than the standard of the 46th of Elizabeth, or 5s. 2d. *per* oz. it would be done at the expence of that justice and integrity between the government and the people, which no government would sanction that regarded the rights of personal property. Mr Locke's arguments were so decidedly just, and so convincing, that the government carried the whole nation with them in the measure, though it was heavily felt, owing to the exhausted state of the country, after the long and expensive war it had been involved in.

Controversies occasioned by this Recoinage.

In the course of a little time after the recoinage was completed, Mr Locke's reasoning was called in question, from the circumstance of the price of silver exceeding its mint price, and the consequent disappearance of the coinage, by melting the coins into ingots for sale at the high market price. As this is an exceedingly curious and interesting portion of the history of our mint affairs, we may be allowed to state a few facts by way of vindicating the accuracy of Mr Locke's theory, and to point out the real cause why its application to practice failed, as it is generally acknowledged that it did; the greater portion of the silver recoinage having, before the year 1717, disappeared from the circulation.

By an *Abstract Account* of the prices which the Bank of England paid for gold and silver bullion in each year, from 1697 to 1811, it appears, that, as early as 1710, they paid L. 4 *per* oz. for standard gold, and 5s. 3d. for standard silver; and, it is probable, that the same price existed at a more early date after the recoinage, though the accounts state no price before 1710. This account we conceive of very great importance, and, we think, will satisfactorily explain why Mr Locke's theory did not permanently produce the effect which the legislature expected from it.

By a reference to the prices paid for gold by the Bank of England from 1710 to 1717, it appears, that the average price *per* oz. was L. 3, 19s. 11d. During this period, the guinea was current for 21s. 6d., at which rate the oz. of gold was coined into L. 3, 19s. 8¾d.; for, if one guinea or 5 dwts. $9\frac{39}{89}$ grs. be worth 21s. 6d., 480 grs. or 1 oz. will be worth L. 3, 19s. 8¾d. It would appear, then, that the market price of gold was only 2¼d. above its mint price; and some debasement by wear may have existed upon the gold currency at this period, causing such excess of the mint price.

While the mint, therefore, coined gold at the rate of L. 3, 19s. 8¾d *per* oz., and silver at 5s. 2d., the relative proportion was as 15.43 to 1. There is only one quotation of silver given for the period in question, and it is 5s. 3d. *per* oz. If we take this as the average price for the seven years in question (and we may be justified in doing so by the market prices which follow in 1718 and subsequent years, as extracted from Castaign's *Papers*, and laid before the House of Commons, and ordered to be printed 4th March 1811), at 5s. 3d *per* oz., the average proportion of gold and silver in the market would be 15.22 to 1. But no individual would carry 15.22 ozs. of silver to the mint to be coined into about L. 3, 18s. 7d. when these 15.22 of silver would procure an ounce of standard gold in the market, which could be coined into L. 3, 19s. 8¾d. making thereby a profit of about L. 1, 7s. 6d. *per cent.* While this profit continued, it may reasonably be inferred that gold, and not silver, would be the standard of our money.

It was in September 1717, that Sir Isaac Newton delivered in his *Report* to the Lords of the Treasury, giving it as his opinion, that gold was considerably overrated in the mint with respect to silver; and, in consequence of this report, the guinea was, by proclamation, dated 22d December 1717, declared current at 21s. It is of importance to observe the effect produced upon the price of gold by this proclamation; and we are of opinion it will completely prove, that the silver currency had not operated as the standard of value during the period in question. When the guinea became a legal tender at 21s., the price of gold became fixed at L. 3, 17s. 10½d. *per* oz. at the mint; for, if 5 dwts. $9\frac{39}{89}$ grs. be worth 21s., 480 grs. or 1 oz. will be worth L. 3, 17s. 10½d. This fall in the price of gold from L. 3, 19s. 8¾d. is 1s. 10¼d. *per* oz., and is equal to about L. 2, 6s. *per cent.* It appears by the abstract of prices paid for bullion by the Bank of England, that in 1718 and subsequent years they paid L. 3, 18s. *per* oz. for standard gold, which is a fall from L. 3, 19s. 8¾d. of 1s. 8¾d. *per* oz.; and if an allowance is made for the debasement by wear, existing at this period upon the gold coin, the fall in the market price of gold will be equal to the reduction in the value of the guinea. But this effect could not have been produced unless gold at the period in question had been the measure of value, and, as such, the measure of its own price.

From these facts, we think the conclusion may be justified, that from 1710, and probably a more early period after the recoinage, to the date of Sir I. Newton's report, the gold money of this country was the standard measure of property; and that the reduction of the value of the guinea, thereby making the relative proportion of gold and silver approximate nearer to those of the market, was the first step of which we have an authentic record, taken by Government to maintain the principles of Mr Locke's theory: and as the avowed intention of this report was to give that rise in value to the silver coin which would protect it from the melting pot, and which could be done by lowering that of gold, it may be inferred, that the legislature were aware that the gold coin had attained the prerogative of being the standard of value at this time. Though the recommendation in Sir I. Newton's report was carried into effect, by making the guinea current at 21s., yet it did not restore silver to its function as the standard of our money; and this, because the current value was not made still lower. Sir I. Newton seemed aware of this himself, and recommended that 10d. or 12d. should be taken from the guinea instead of 6d. This however was not done; and, as the rate of 21s. to the guinea, the proportion of standard gold to standard silver, at the mint, was as 15.07 to 1, the proportion of the market, as we find by the prices of gold and silver at this period in Castaign's *Papers*, was about 14½d. to 1; which constitutes a difference of about 3 *per cent.*, gold being still thus much rated above its value to silver; and consequently, not only was no silver coined, but the good and heavy coins were still melted for the high price they brought in the state of bullion. It is surprising that the Government, having seen the operation of the principle recommended in the report of Sir I. Newton, did not carry it a little further, and bring the current value of the guinea to a par with the market proportion of the two metals, and so render it the interest of the public to carry silver to the mint to be coined.

Before concluding our observations upon this highly interesting subject, we must remark, that the great Mr Locke himself did not impute the high price of silver, after the recoinage, to the cause to which we have here assigned it. He attributed it to the permission of exporting silver bullion, and to the prohibition of exporting silver coin. This permission, he said, rendered the demand for silver bullion greater than the demand for silver coin. Dr Adam Smith remarks upon this opinion, that the number of people who want silver coin for the common uses of buying and selling at home, is surely much greater than that of those who want silver bullion, either for the use of exportation, or any other use. There subsists at present a like permission of exporting gold bullion, and a like prohibition of exporting gold coin; and yet the price of gold bullion has fallen below the mint price. But in the English coin, silver was then, in the same manner as now, underrated in proportion to gold; and the gold coin (which at that time was not supposed to require any reformation) regulated then, as well as now, the real value of the whole coin.

No other legislative measure having been taken than what we have mentioned, founded upon the *Report* of Sir I. Newton, and the market proportion of gold to silver having seldom rendered it the interest of the public to coin silver; this accounts satisfactorily for the degraded state of our silver currency for the last century.

Recoinage of Gold in 1774.

In the year 1774 and subsequent years, we had a general recoinage of our gold currency, which forms the next prominent feature of our mint history. The avowed object of this recoinage was a reformation of the light and defective coins then in circulation; and the motive for doing so was to prevent the new and heavy coins from being selected from the circulation, and melted for the high price which the gold brought in the state of bullion. In fact, L. 4 of the gold coin then in circulation would not weigh more than an ounce; and, by reference to the prices paid by the bank for gold, we find that this was the market price. The holders of bank notes demanding new and heavy coins for them, required the bank to have a large coinage of gold annually, to supply this demand. These coins were melted, and sold in the state of bullion to the bank for the high price of L. 4 *per* oz. To remedy this inconvenience, the recoinage was completed. And it had the effect desired; for the price of gold, for upwards of twenty years, never exceeded, but was rather under its mint price.

Political economists have disagreed as to the cause of the high price of gold previous to the recoinage. Dr Smith says, "By issuing too great a quantity of paper, of which the excess was continually returning, in order to be exchanged for gold and silver, the Bank of England was for many years together obliged to coin gold to the extent of between eight hundred thousand and a million a year; or, at an average, about eight hundred and fifty thousand pounds. For this great coinage the bank, in consequence of the worn and degraded state into which the gold coin had fallen a few years ago, was obliged frequently to purchase bullion at the high price of L. 4 *per* oz., which it soon after issued in coin at L. 3, 17s. 10½d. an oz.; losing in this manner between 2½ and 3 *per cent.* upon the coinage of so very large a sum. Though the bank, therefore, paid no seignorage, though the Government was properly at the expence of the coinage, this liberality of Government did not prevent altogether the expence of the bank."

Mr Ricardo very justly remarks upon this passage, that, "on the principle above stated, it appears most clear, that, by not reissuing the paper thus brought in, the value of the whole currency, of the degraded as well as the new gold coin, would have been raised; when all demands on the bank would have ceased;" or, in other words, the price of gold would have fallen to its mint price.

Mr Buchanan is not of this opinion; for he says, "that the great expence to which the bank was at this time exposed was occasioned, not, as Dr Smith seems to imagine, by any imprudent issue of paper, but by the debased state of the currency, and the consequent high price of bullion. The bank, it will be observed, having no other way of procuring guineas but by sending bullion to the mint to be coined, was always forced to issue new coined guineas in exchange for its returned notes; and when the currency was generally deficient in weight, and the price of bullion high in proportion, it became profitable to draw these heavy guineas from the bank in exchange for its paper; to convert them into bullion, and to sell them with a profit for bank paper, to be again returned to the bank for a new supply of guineas, which were again melted and sold. To this drain of specie the bank must always be exposed while the currency is deficient in weight, as both an easy and a certain profit then arises from the constant interchange of paper for specie. It may be remarked, however, that to whatever inconvenience and expence the bank was then exposed by the drain of its specie, it never was imagined necessary to rescind the obligation to pay money for notes."

Mr Ricardo remarks upon this passage, that "Mr Buchanan evidently thinks that the whole currency must necessarily be brought down to the level of the value of the debased pieces; but surely by a diminution of the quantity of the currency, the whole that remains can be elevated to the value of the best pieces." With this opinion of Mr Ricardo we cordially agree, and it is upon this principle that a seignorage can be laid upon coinage, without any one directly paying for it as a tax. By restricting the quantity of a currency, this seignorage may be 10, 20, or even 50 *per cent.*, and the price of gold neither raised above its mint price, nor the bank subjected to a run for guineas.

New Constitution of the Mint.

During the period of these important transactions, the constitution of the mint remained without alteration. It had not, however, escaped the attention of the legislature, for we find that, on the 7th February 1798, his Majesty, by an order in Council, was pleased to appoint a Committee of his Privy-Council "to take into consideration the state of the coins of this kingdom, and the present establishment and constitution of his Majesty's mint." The first effort of this committee was to advise the erection of a new mint, with improved machinery, which desirable object was accomplished between the years 1805 and 1810: And in March 1815, a new constitution was introduced, founded upon a very valuable *Report*, drawn up and presented to this Committee by the Right Honourable W. Wellesley Pole, who had been appointed Master of the Mint in the preceding year.

We cannot better explain the whole constitution and bearings of the establishment, than by detailing the rules, regulations, and instructions, applicable to the duties of the different departments.

The proper duties of the Deputy-Master and Worker are,

To receive, on account of the master and worker, his Majesty's own bullion of gold and silver, as well as the bullion of any other person, brought to the mint for coinage:

To give acknowledgments for the same, specifying the number of ingots, or parcels of coin, according to the purport of any invoice or bill delivered therewith:

To see the ingots safely deposited in the care and joint custody of himself and the master's assayer, for the purpose of being assayed previous to their importation into the office of receipt:

To cause the ingots, when duly assayed, to be brought into the office of receipt without delay, there to be weighed in the presence of the importers and cheque officers:

To make out a mint bill, to be delivered to the importer, testifying the weight, fineness, and value of the several ingots, &c. together with the day and order of the delivery into the mint, and to sign a receipt annexed to the said bill, witnessed by the Comptroller and King's clerk:

To give directions to the master's *first* clerk, for the combining or potting the ingots for the melting, with the proper portion of alloy; and to see that the same be duly entered by the said *first* clerk and melter, in the pot-book, and the said book examined by the Comptroller and King's clerk; and to deliver out of the strong-hold such ingots and bullion as are potted, and charge the melter therewith, according to the standard weight of each pot:

To keep an account of the bars received from the melting-house, and delivered to the moneyers, and also of the scissell returned by the moneyers to the melter, for which their respective receipts will be given and entered in the pot-book, that they may be charged therewith:

To receive the coined monies from the moneyers, after the same have been duly tried at the pix by the King's assayer, Comptroller and King's clerk; and to deliver the same to the importer, receiving back at the same time the mint bill which had been given; or if the same be not cleared off, to require that such portion thereof as has been delivered, be indorsed on the bill by the parties, by a receipt, till the whole be discharged:

To seal and lock up in the usual chest, in conjunction with the King's assayer and comptroller, the pieces reserved for the public trial of the pix, and to make good to the parties the pieces so taken, by payment in their sterling value; charging the same to the public expence:

As first executive officer of the mint, to watch over every branch of the department, and to inspect and oversee, as much as lies in his power, the meltings, assayings, and all the different processes of the coinage, and to report to the master on the conduct of the officers:

To draw and indite all letters, instructions, commissions, and other writings agreed upon and ordered by the master and worker, for the service of the office, and to have the same recorded by the clerk of the papers:

To receive all monies issued at the exchequer or elsewhere, for the service of the mint; and to keep the public account of the master, to be laid annually before the auditors of public accounts, with the proper vouchers, the said account to be signed and attested by the master himself:

To make quarter books of the salaries, wages, allowances, &c. due to the several officers, clerks, artificers, and others belonging to the establishment; and to make payment thereof on the quarter days, namely the 5th of January, the 5th of April, the 5th of July, and 10th of October, whenever there shall be funds for that purpose: Also, to pay the moneyers and melters charges for coinage, according to the rates set forth in their respective agreements with the master; the same to be payable out of the monies issued for the service of the mint, the salaries, &c. being previously discharged: Also, to pay the incidental expences and disbursements usually incurred in the different offices; and to pay the solicitor his account for disbursements in carrying on prosecutions for offences against the laws relating to the coin, out of such monies as shall be impressed from time to time, for that service, exclusive of the ordinary allowance:

To receive all the fees arising to the master's office under the indenture or otherwise, and to apply the said fees to the payment of the master's salary, in the manner directed by the act 39th Geo. III. and to account for the same to the Lords Commissioners of his Majesty's Treasury, by half-yearly statements, showing the deficiency of the fees, and the sum to be provided, or the excess, as may happen; and to make out a yearly account to the Treasury:

For this office he is to give the usual security, or such other as may be required by the Lords of the Treasury:

In conjunction with the comptroller, to inspect and examine the accounts of the clerk of the irons, as to the dies supplied to the engraver and moneyers, and the faulty ones destroyed:

To attend the duties prescribed by the act 14th Geo. III. respecting the standard money weights.

The proper duties of the King's Assayer are,

To keep a book of the assays made by him, of all such gold and silver as may be brought into the mint, whereby the quantity and fineness may appear:

If the master of the mint, or the merchant, or importer, who brings his gold or silver for coinage, may not accord between them of the true value of the bullion, or if it be not malleable and fit for working, or sufficiently nigh to the standard, according to the customs of the mint, the King's assayer is to try the truth in that part, in the presence of the master and comptroller, and the master shall receive the same in manner as it becometh:

To report (after the bullion has been weighed, potted, and melted) the assay of every several pot, commonly called the pot assay, which pot assay shall be made of some bar of the said bullion, to be taken by the comptroller, the King's assayer, or surveyor of meltings, or any one of them, after the pot is cast out; the said report to be made in writing, and delivered through the office to the surveyor of meltings:

To take care that the bars of gold and silver be melted, and the monies made agreeably in fineness, to the indented trial plates, made by direction, and ordered to be used by the royal authority; whereof one trial plate for the gold, and one for the silver, shall remain with the King's assayer:

In conjunction with the other principal officers to oversee and survey the assaying, and melting, and making the monies, at all times and in all places; and endeavour and procure that the said monies, and every of them, shall be properly made and perfected:

To see and procure, with the comptroller, and weigher, and teller, that the balances and weights be put to point from time to time, when they shall need it; so that no default be found in them, to the hurt of his Majesty and his people:

To make proof (by a process called the pixing) of the monies before their deliverance to the bringers in of the bullion; the said proof to be made in the presence of the master and worker, comptroller, and King's clerk, by an assay to be taken of the fineness as well as of the weight, by such quantity, and after such sort as shall be agreed on, or as has been customary, namely, by weighing the pound weight in tale; and taking one piece out of every journey weight of gold and silver respectively for the assay of the fineness, as directed by the mint regulations. To report thereon, and the report to be entered in the pix books:

In conjunction with the master, and worker, and comptroller, to see a portion, namely, one piece out of every journey weight of the said monies (after they have been proved to be good), ensealed in a packet, and put into a box (called the pix-box), to be locked up under the separate keys of the said officers, there to remain until trial thereof by jury (called the trial of the pix) shall be made before the King, or such of his council as are usually appointed at Westminster, or elsewhere, for that purpose:

He shall be bound to instruct in the art of assaying, the probationer assayer, who shall be nominated by the King's assayer, and approved by the master and worker:

To attend the duties prescribed by act 14th Geo. III. respecting the standard money weights.

The proper duties of the Comptroller are,

To enter on record in a journal or ledger, all such bullion of gold and silver as shall, from time to time, be brought into the mint, which entry shall comprehend the weight as declared by the weigher and teller; the fineness as reported by the master's assayer; and the value of the said bullion, the parties names that brought it, and what day:

To deposit at the office of receipt in the strong-hold, of which he shall possess a key (in conjunction with the deputy-master and worker, and King's clerk), the bullion, after it shall have been received, and the assays and weight thereof made, reported, and entered, there to remain until it is required to be delivered by the deputy-master for the meltings:

In conjunction with the King's clerk, to take an account of the ingots delivered by the deputy-master out of the strong-hold for the meltings, according to the entry made by the master's first clerk and melter in the pot-book, and to examine the said book as to the calculations of the quantities and fineness, of all manner of gold and silver and alloy, combined and put to each pot respectively for the meltings, and to subscribe the same with his initials:

To take also an account and oversee the weighings of the bars and scissell, passed through the office between the melter and moneyers; for which their respective receipts shall be entered in the pot-book:

To keep an account of all the deliveries of the monies, and to ascertain, at the end of every month or oftener, the balances due by the master to the several importers, and also the balances in the hands of the moneyers and melter, and agree the same with the deputy-master, who is to charge the said moneyers and melter therewith accordingly:

In conjunction with the other principal officers, to oversee the melting, rolling, sizing, and making, the monies, at all times and in all places; and endeavour and procure that the said monies and every of them shall be properly made and perfected:

To see and procure, with the King's assayer, and weigher, and teller, that the balances and weights shall be put to point from time to time when they shall need it, so that do default be found to the hurt of his Majesty or his people:

To attend the proof and trial (called pixing) of the monies before their deliverance to the importer, and to try the weight of some of the pieces in each journey weight singly, as a check that there may be no great variation from the true weight; and also to retain two pieces from each journey weight, one to be delivered to the King's assayer for his assay, and the other to be locked in the pix-box, to be tried before the King or his council;—to docquet the parcel containing the pieces for the pix, and with the other officers enseal the same, and lock it in the pix-box:

To deliver upon oath, before one of the Barons of Exchequer, a roll, which shall be called a Comptroller's Roll, containing an account of all the gold and silver monies coined monthly in the said mint:

In conjunction with the deputy-master to inspect and examine the accounts of the clerk of the irons, as to the dies supplied to the engraver and moneyers, and that the faulty ones be destroyed:

To attend the duties prescribed by act 14th Geo. III. respecting the standard money-weights.

The proper duties of the Superintendent of Machinery and Clerk of the Irons are,

To inspect, from time to time, the several steam-engines and boilers, and the machinery, apparatus, and implements, used in the coinage, and to see that the same are kept in proper order for immediate working, at all times:

To oversee and direct, in conjunction with the company of moneyers, the artificers and workmen employed by Government about the machinery, in doing all manner of work that may be expedient; and likewise in the construction of all the smaller implements and tools necessary to carry on the coinage, upon the principle of the machinery erected; the repairs and work being ordered under the authority of the master and board of mint officers:

To superintend the working of the machinery, and instruct (to the best of his ability) the officers and moneyers in the use and management of it; and to report to the board upon any neglect or misuse:

To examine the several accounts of expences incurred in the machinery,—certifying, in pursuance of the agreements entered into between the master and the moneyers, the charges, both in respect to the bills, and also the wages to the artificers, which shall respectively be borne both by the Government and the moneyers.

As Clerk of the Irons,

To superintend the die press-rooms, and purchase, or procure to be forged, at the cheapest rate, to be approved by the board, all such dies as shall be ordered by the board, and to take care that the same are of the best quality, and properly forged:

To oversee the workmen in the die press-room, and that the dies be skilfully sunk and hardened, and properly turned; and to attend to all matters and things for the well ordering and conducting this service:

To keep a true account of all the blank dies, matrixes, and puncheons, for coinage, which shall be delivered to the engravers, or that shall be sunk or stamped by the engravers, and after stamping made fit for use and hardened:

To require the engravers, monthly, to return as many dies as shall be found faulty and worn:

To give an account, as often as required, to the master and comptroller, of the blank dies delivered to the engravers, and the faulty ones returned, that a just account may be kept, and all the faulty dies defaced:

To unlock, and be present, whenever the great die-press for multiplying the dies is used; to be responsible for its not being applied for improper purposes; and that no medals, pattern-pieces, or coin of any description be struck, but by a written order from the master or his deputy.

The proper duties of the King's Clerk, and Clerk of the Papers, are,

To attend the weighings in, and enter in his ledger-book an account of all such bullion of gold and silver, as shall be brought into the mint, describing the weight and fineness as reported, the parties names that brought it, and the day:

To deposit at the office of receipt in the strong-hold, of which he shall possess a key in conjunction with the deputy-master and comptroller, the bullion, after it shall have been weighed in, and the weight and assays reported; there to remain until it shall be required to be delivered over by the deputy-master for the meltings:

In conjunction with the comptroller, to take an account of the ingots delivered by the deputy-master to the melter, as set down in the pot-book, and to examine the calculations of the pot-book as to the quantities and fineness of all manner of gold, and silver, and alloy, put to each pot, and to subscribe the same with his initials:

Also to take an account and oversee the weighing of the bars and scissell passed through the office between the melter and moneyers, for which their respective receipts shall be entered in the pot-book:

To attend the pix and deliverance of the monies, and record the same, and agree the master's, melter's, and moneyer's balances, up to the end of every month:

To enter (as clerk of the papers) in the record-book, all office-letters, papers, appointments, warrants, and proceedings of the board:

To assist the deputy-master in the secretary department, and instruct the master's second clerk in the keeping the proper entries of bills and accounts for expences incurred, or in making copies of all such papers as shall be required by the master or his deputy, or by the board.

General Instructions for the common duties of the Principal Officers (before-mentioned), to be by them observed.

To make their ordinary habitations and abode in the houses assigned them within the mint:

To meet in the board-room at the mint office every Wednesday (after the delivery of the monies), or on such other day and hour as the master, or the service of the mint, shall require, there to form a board. Three members (the master or his deputy being one) are competent to act:

To consult together, and order all business appertaining to them concerning the office, determining the hours of attendance of the several officers, the receipts of the bullion, and the delivery of coin:

To consider and give directions to the solicitor of the mint, from information laid by him before the board, for undertaking prosecutions for offences relating to the coin, and require him to report, from time to time, as to the state of the prosecutions and convictions:

To take up and employ such smiths, workmen, and labourers as may be severally wanted in the die department and assay offices; and for assisting in the porterage and weighing of the bullion and coin in the office of receipt, and to order the superintendent of machinery and clerk of the irons, to purchase or procure to be forged, all such dies as are necessary for the coinage or service of the mint, and to provide all necessaries, and do all manner of business within the mint, as may be needful:

To observe, follow, and perform, all orders, warrants, or significations of the master and worker, whether grounded upon warrants from the King, the Lords of the Committee of Council for coin, or the Lords Commissioners of the Treasury; and in all things to obey jointly or severally, in their respective places, such directions as he shall from time to time judge necessary and fit to give for the service of the mint;

To see that the accounts of the office for the receipt of the bullion and delivery of the coin, as well as the check and control thereof, be kept in due manner, as prescribed, and that the comptrolment roll of the monies, coined monthly, be exhibited yearly to the auditors of public accounts :

To see also that the receipts and payments of all monies for the service of the mint, be charged and accounted for in the master's public account, and that all bills, accounts, and statements, belonging thereto, be examined and allowed under at least three signatures of the principal officers, of which the master's deputy is to be one, previously to its being laid before the audit office :

Also to examine and report to the Lords Commissioners of the Treasury on the fees derived to the master's office ; and the application thereof, pursuant to the act 39th Geo. III. as stated in the receiver's account ; in order that the same may be declared and passed :

To prescribe to the under officers and servants, their several charges and duties, and to see the due performance of them, and in case of negligence or unfaithful conduct, to report to the master ; or, as far as the board are authorized, remove them from their situations :

Not to suffer the works of the mint to be viewed without an order signed by the master ; or any stranger or foreigner, not having business at the mint, without knowledge of his quality, to have intercourse with the officers while performing their duties.

The proper duties of the Master's Assayer are,

To receive from the master and worker all manner of gold and silver ingots brought to the mint :

To deposit the same in the joint custody of the deputy-master and himself, in the strong-hold of the assay office, till the assays are made :

To cut one or more pieces from each ingot (as he may think proper), and assay the same :

To make written reports of the assay of each ingot, describing the fineness, date, and name or mark of the importer, and keep a record thereof. To make also such remarks on the quality of the bullion as may be needful for the master's information, and to deliver the list usually given by the importer, of the purchase assays :

To give instructions for the classing of certain of the ingots together, so that the bullion may be mixed and worked as close to the standard as possible, and advantages procured by the mint assay :

To deliver the ingot when assayed into the office of receipt :

The proper duties of the Master's First Clerk and Melter are,

To superintend and carry on the operations of the meltings and refinings, according to agreements (stating the prices and conditions) to be made from time to time between the master and melter :

To attend the weighings in at the office, and rate and standard the ingots in conjunction with the other officers ; and their several accounts agreeing, to enter the same in his journal ; so that no difference may arise between the deputy-master and himself as to the value of the bullion to be delivered to melt :

To arrange under the direction of the deputy-master from the said journal, and from the list of ingots classed by the master's assayer, the combination of the bullion for melting, and to make the proper calculations of the quantities and fineness of all manner of gold and silver and alloy put to each respective pot, and to enter the same fairly in a book (called the pot-book), and subscribe his initials to each pot so made up :

To receive the bullion so prepared from the deputy-master, to be deposited and melted under the joint custody and inspection of himself and the surveyor of meltings :

To melt and cast the bars (according to agreement), and, after they have been assayed and reported standard by the King's assayer, to deliver them into the office of receipt ; there to be weighed by the weigher and teller, in presence of a cheque officer, and passed to the moneyers :

To receive the returns of scissell, light work, and ends (according to agreement), from the moneyers, to be weighed in like manner, the receipts between the moneyers and melter for the bar and scissell being entered in the pot-book :

To receive from the deputy-master all such gold and silver as may be necessary to refine ; to make up an account in the pot-book of each charge, showing the standard amount, to be signed with his initials, and examined by the comptroller and King's clerk ; and to supply a quantity of fine ingots, equal in standard weight by computation to the amount delivered to refine, the same to be assayed by the master's assayer, and weighed into the office of receipt, and rated and standarded so as to combine and pot with the coarse ingots :

To agree the balances remaining in his hands with the deputy-master, at the end of each month :

To employ and instruct the master's second clerk in the art of melting bullion ; and *lastly*, to be ready to do his work at all times, when he shall be warned by the master and worker ; and to attend to his Majesty's service as need shall require, both morning and afternoon, and to work so many hours every day (Sunday excepted) at such tasks as shall be thought fit by the master, and appointed by the board.

The proper duties of the Provost and Company of Moneyers are,

To superintend and carry on jointly as a company the several processes for the manufacture of the coin, in the rolling, annealing, blanching, cutting out, sizing, and stamping, according to agreements (specifying the prices and conditions) to be made, from time to time, between the master and worker, and the provost and company :

To receive the standard bars of gold and silver for making the monies, from the melter at the office of receipt, there to be weighed by the weigher and teller, in the presence of a check officer, and to give receipts for the same, to be entered in the pot-book :

To coin such quantities of the different species of the monies as shall be directed by the master (ac cording to agreement), and to bring the said monies (in clean pieces) into the office of receipt, in journey weights; there to be tried at the pix and weighed:

To deliver the monies proportionally in weight, according to the bars received; and if any thing lack of the weight at the time of deliverance, to content and pay unto the master the balance at the time of the delivery:

To make out of the bars which shall be delivered to them clean and fit to be wrought, seven twelfth parts into money, so that there be but five parts in twelve scissell:

To return the scissell, light work, and ends to be remelted, proportionally (according to agreement); the same to be delivered into the office of receipt, to be weighed by the weigher and teller, in the presence of a check officer, and to take receipts from the melter, to be entered in the pot-book:

To agree with the deputy-master, the balance remaining in their hands at the end of each month, that they may be charged therewith; and from time to time (as the master shall require) make full payment and deliverance of all manner of monies, with all convenient speed, in order to discharge the said balances, or bring in sufficient supplies of gold and silver, bullion, or ingots, equal in value, according to the weight and assay to be made thereof at the time:

Not to take either singly by the provost, or jointly by the company, any apprentice to be instructed in the art or mystery of a moneyer, or any part thereof, without the licence and permission of the master first had and obtained under his hand in writing:

To oversee, in conjunction with the superintendent of machinery, who is to direct the same, the artificers employed by government about the machinery, in doing all manner of work that may be expedient, and in the construction of the smaller tools and implements for the coinage:

To be ready to do their work at all times without denial, when they shall be warned by the master:

Duly to attend his Majesty's service, in the present way of coining, as need shall require, both morning and afternoon; and to work at such tasks, and so many hours every day (Sunday only excepted), as shall be thought fit by the master, and appointed by the board, according to the labour of their respective tasks, and the length of days:

Neither the provost, nor any of the moneyers, their apprentices or servants, at any time, to vend, pay, or distribute any piece or pieces of the coined monies, until the same shall have been delivered by them, according to the course of the mint, into the office of receipt, and duly assayed and pixed.

The proper duties of the Chief Engraver are,

To make and frame such draughts and embossments, or receive such models for engraving, as the master shall direct:

To engrave from the said designs or models all such matrixes and dies as the master shall direct, and the service of the mint require:

To oversee from time to time the multiplication of the puncheons and dies, in the die press-room, and to receive the dies from the superintendent and clerk of the irons, that they may be delivered to the surveyor of the money presses in a proper state for the use of the coinage:

To return monthly to the superintendent and clerk of the irons, as many dies as shall from time to time be found faulty, and worn by using or otherwise:

Not to work, or make, or grave any puncheons, matrixes, dies, or stamps, for the making or coining of any money, but only in such places in the mint as shall have been assigned thereunto:

To oversee the striking of the monies in the coining press-room, and to direct all such dies as are faulty to be taken out of the press, and fresh dies put in, that the monies may be properly struck.

The proper duties of the Weigher and Teller are,

To weigh at the office of receipt, under the master's direction, all manner of bullion brought to the mint to be coined, or for the service of the King:

To weigh the bullion, according to such weight or draught (near to a journey weight) as has been customary:

All importations to be weighed in the presence of the deputy-master, or master's clerk, comptroller, or King's clerk, and the importer, who is to state the weight of each ingot from his list, for the guidance of the weigher:

To declare the weight aloud from his scale, that the same may be taken down by the officers and importers:

In conjunction with the other officers, to see that the bullion is free from dirt, and in a fit state for weighing, and to do strict justice, as much as in him lies, between the parties:

To weigh the bars and scissell, passed between the moneyers and melters, and declare the weight of each draught; and also all supplies of fine ingots received from the melter; and the balance or supplies of ingots, &c. made from time to time by the moneyers and melter:

To weigh the coined monies from the moneyers to be delivered to the importers in even journey weights, or to declare the plus or minus on each draught, that the same may be recorded, and the moneyers made answerable for the deficiency of weight or balance at the time of deliverance:

To attend the pix, and tell out the number of pieces contained in a pound weight Troy of the respective species of monies to be delivered to the King's assayer for trial:

To undertake by himself, or by a proper workman in the mint (according to an agreement of prices and conditions), to clean and adjust the beams, &c. in the office of receipt, and to keep the same in order, so that they be always ready and perfect for working.

The proper duties of the Surveyor of Meltings are,

To survey the meltings of all gold and silver, and to take care that the ingots or bullion, according to the number and description in the pot-book, with their proper alloy only, to be weighed by himself, be put into the pot they are respectively set out for:

To see that nothing but scissell or such returns of ends as be clean and good, of gold and silver, respectively, be put into the pots of scissell:

During the time the pots are melting not to absent himself, or to be out of view of the pots so melting, until they have been poured off:

To take two or more assay pieces from some bar or portion of each pot cast from the top, middle, or bottom, of the pot, as agreed with the King's assayer:

To fold up each assay-piece in a paper, docqueted with a description of the ingots and alloy, or scissell, &c. melted in each pot, the number of the pot and the date, and to deliver the same to the King's assayer:

To possess a key of the strong-holds in the melting house, and not to suffer any bars of gold or silver to be delivered out of his custody, until such time as they have been duly assayed and reported good, which reports will be made to him in written notices, transmitted through the office by the King's assayer:

To keep a book containing the weight of all gold and silver as shall be molten from time to time, with the alloys put into the same.

The proper duties of the Surveyor of the Money Presses are,

To inspect the coining presses, and to have a distinct and separate lock upon each of the presses:

To be present at the striking of the monies, and not to suffer the presses to be used for striking any pieces or coins but such as the master shall direct:

To have the custody of the dies received from the engraver and clerk of the irons, to give out the same for coinage, and return the faulty ones to the chief engraver, to be delivered to the clerk of the irons:

To polish the dies, or oversee the doing of the same, when the moneyers are coining:

To inspect the monies, that they be well made and free from brokages, and faulty or dirty pieces; and to do, execute, and perform, all such other works and services in the said office as the master shall direct and appoint.

The duties of the Probationer Assayer are,

To receive instructions from the King's assayer for acquiring a knowledge and proficiency in the art of assaying:

To do all such services in carrying on the business of the assay-office, as the King's assayer shall require, and the master direct.

The duties of the Master's Second Clerk are,

To make out fair copies and entries of all such accounts and papers as might be required in the master's office, and to do all such services in the said office, as the master or deputy-master shall direct or appoint:

To receive instructions from the master's first clerk and melter in the art and undertaking of the meltings.

The duties of the Assistant Engraver are,

To assist the chief engraver in the engraving of the reverses, lettering, or such other parts of the dies as the chief engraver shall appoint:

To receive instruction from the chief engraver in the art of engraving, and to render all such services in the department as the chief engraver shall require, and the master direct.

The duties of the Mint or Bullion-Porter are,

To attend the office daily, if required:

To be present at all importations and deliveries at the office:

To mark on the assay paper the weight of each ingot weighed at the scale:

To arrange, with the assistance of the master's porter, the ingots in the strong-hold, and put them together in pots, to be carried down to the melting-house:

To oversee the under porters in giving all proper assistance at all the weighings, and in the receipt into the mint of all bullion, and deliverance of monies or bullion:

To give the regular notices for the attendance of the officers, and other persons at the office, for business, and to do all such services as shall be directed by the master or board.

The proper duties of the Warden of the Mint are,

In conjunction with the master and comptroller, and with the assistance of the King's assayer, to make the weights of a guinea and of a shilling, according to the established standards, and also parts and multiples of the same, to be presented to council, and, if approved, to become standard weights, to be lodged in the mint:

To have the custody of the said weights at the mint, in conjunction with the master and comptroller:

To make also, in conjunction with the master and comptroller, and with the assistance of the King's assayer, copies or duplicates of the said weights, to be lodged with an officer called the stamper of money weights:

To summons once, or oftener, in every year, by warrant under the hands of himself, the master and comptroller; the stamper of money weights to appear before them, and produce the said duplicates of the standard weights, to be examined and compared with the standard weights lodged at the mint office in their custody:

To pay the salary allowed to the stamper of money weights out of monies to be entrusted to him for that service by the master of the mint:

No person to be appointed to act as deputy to the warden, without the sanction of the Lords of the Treasury.

The proper duties of the Stamper of Money Weights are,

To attend the summons of the warden, master, and comptroller, and to have the duplicate weights in his possession compared with the standard weights at the office, at least once a-year:

To adjust the duplicate weights by the said standard weights, that all weights for weighing gold and silver money may be regulated by the said duplicates:

To stamp the weights made use of in weighing the money, receiving a fee of one penny on every twelve weights stamped or marked pursuant to act of Parliament:

No other weights but those stamped by the stamper of weights, to be accepted by law, for determining the weight of the coins; and persons counterfeiting the stamps, or altering weights so stamped, to be fined and imprisoned:

Not to interfere with the weights of the founders' company, if they have their weights sized and marked as above:

To receive the salary allowed to his office from the warden or his deputy.

The proper duties of the Solicitor of the Mint are,

To attend the board of mint officers every Wednesday, or such other day as may be appointed, to lay before them such information and depositions, in regard to persons offending against the laws relating to coin, and to receive the board's orders for acting thereupon:

To act in conformity to such order, in the prosecution of all such persons as shall clip, counterfeit, melt down, wash, file, or diminish the current coin of the kingdom, or alter any counterfeit coin, knowing the same to be counterfeit, or be guilty of any crime or offence concerning the said coin or money, or against the laws relating to them:

For the better carrying on of the prosecutions that may happen, at the same time, in different counties, to substitute and employ such other person as he shall see fit in his stead:

To make out quarterly accounts of the expences of the prosecutions, with the proper vouchers, to be examined by the board of mint officers, showing the disbursements made by him; and to make an abstract account at the end of every year, of monies received and expended, that the balance may be ascertained and the account discharged.

Usual Routine of Business at the Mint.

We shall now proceed to state the regular routine of the business of the mint, when the processes of the coinage are going forward, under the various check-officers whose duties we have enumerated.

Gold.

The Bank of England are the usual importers of gold bullion. When they bring a parcel of gold for coinage, say, for example, 12 ingots; on their being brought to the mint, they are deposited with the master's assay-master, and under the key of the deputy-master of the mint, where they remain until the assay-master has made an assay of every ingot separately. When he is ready to deliver the assay reports of the said bullion to the master and worker or his deputy, the importers are required to attend in the mint office of receipt, where the said assay reports are read over by the weigher and teller. The same are recorded, according to their numbers, in the journals of the master, comptroller, and master's first clerk. To render this more intelligible to our readers, we shall insert the form of an importation of gold, by way of example, and make the same into pots, for the process of melting, which immediately follows its importation. The letter B is for better, and W for worse, than standard fineness, and the figures on the left hand are the excess of fineness above standard, and those on the right hand, the excess of alloy beyond standard gold.

Saturday, 20th September 1817.

Importation from the Governor and Company of the Bank of England, of 12 Gold Ingots for Coinage.

Rating.	Assay Report.	Weight of Ingot.	Rating.
1 17 12	No. 1 B. 1 *carat grs.*	15	
1 17 0	— 2 1	15	
1 17 12	— 3 1	15	
	— 4 W. 1	15	1 17 12
	— 5 1	15	1 17 12
	— 6 1	15	1 17 12
1 17 12	— 7 B. 1	15	
1 17 12	— 8 1	15	
1 17 12	— 9 1	15	
	— 10 W. 1	15	1 17 12
	— 1 1	15	1 17 12
	— 12 1	15	1 17 12
11 5 0		Gross 180 Standard 180	11 5 0

A mint bill is given to the importer for this bullion, testifying the weight, and fineness, and value of the several ingots, together with the day and order of the delivery into the mint. A receipt is annexed to the bill signed by the deputy-master, and witnessed by the comptroller and King's clerk. When the said bullion is delivered to the importers in the state of coin, the mint bill is received back at the same time by the deputy-master and worker.

The first clerk and melter is next required to pot the gold for melting, and the same is recorded in the pot-book as follows:

Saturday, 20th September 1817.

FIRST POT.

Nos.	Bank Eng. 20. Sep.			
1.	————————	1 17 12	15 0 0	
2.	————————	1 17 12	15 0 0	
3.	————————	1 17 12	15 0 0	
4.	————————		15 0 0	1 17 12
5.	————————		15 0 0	1 17 12
6.	————————		15 0 0	1 17 12
		5 12 12	90 0 0	5 12 12

SECOND POT.

Nos.	Bank Eng. 20. Sep.			
7.	————————	1 17 12	15 0 0	
8.	————————	1 17 12	15 0 0	
9.	————————	1 17 12	15 0 0	
10.	————————		15 0 0	1 17 12
11.	————————		15 0 0	1 17 12
12.	————————		15 0 0	1 17 12
		5 12 12	90 0 0	5 12 12

These pots are delivered to the melter, and placed to the debit of his account in the books of the deputy-master, comptroller, and King's clerk.

If the melter does not immediately melt the bullion when delivered to him, it is placed in his stronghold, to which there are two keys, one of which is kept by himself, the other by the surveyor of the meltings.

When the bullion is to be melted, the surveyor of the meltings is in attendance, and examines that the ingots correspond with the numbers recorded in the pot-book, and, when satisfied that they are correct, the ingots belonging to each pot respectively are charged into the melting-pot, and it is his duty to attend until they are melted and cast into bars, without ever leaving the melting-house.

When the betterness and the worseness of the ingots do not balance each other (as we see it does in the examples above), but when there is an excess of betterness, which requires an addition of alloy, it is calculated after the standard of 22 carats of fine gold, and 2 carats of alloy, being the English standard of gold. The alloy is weighed by the surveyor of the meltings, and put into the melting-pots in his presence. And when there is an excess of worseness, which requires an addition of fine gold to produce the standard of the coin, the same is weighed by the surveyor of the meltings, and put into the melting-pots in his presence.

The gold is melted in pots made of black lead. Those chiefly used in the royal mint are of foreign manufacture; and are less liable to break in annealing than pots of English manufacture, from their having more black lead and less clay in their composition. Before the gold is charged into the pots, the pot is placed in a furnace of 14 inches square, and 20 inches deep from the grate. It is placed on a stand usually cut from the bottom of an old pot, and is about an inch or inch and half thick. This is covered with coke dust, which makes the pot part from it when withdrawn from the furnace, when the metal is melted. To give depth to the pot, a muffle is placed upon it, which is in fact an old pot cut in two, and the wide end fitted to the mouth of the pot. The muffle is covered with the other half of the old pot, so that it is one pot inverted over another. The object of this contrivance is to give an additional depth of 4 inches of fuel above the pot, by which a more equal degree of heat is given to the melted gold, which is an object of great importance, otherwise there might not be an uniform mixture of the alloy and fine gold, which is easily effected at a proper degree of temperature. By removing the top which covers the muffle, the process of the melting can be inspected as required. The furnace is lighted by putting a little ignited charcoal over the grate, and around the melting-pot. About 4 inches of coke is put over the charcoal, leaving the door of the furnace open, and the damper, which communicates with the flue of the furnace, shut. As soon as the coke is properly ignited, the furnace may be filled to the height of the muffle with coke; and leaving the door still open, and the damper shut, the fire will gradually burn through, and not endanger the pot, by being too suddenly heated. When the pot is heated to a bright red, the gold is charged, and generally the pot, weighing from 90 to 105 lbs. Troy, is melted in one hour. When the metal is thoroughly melted, it is well mixed or stirred, with a rod of black lead, which is heated to a bright red before putting it into the metal. The pot is then withdrawn from the furnace, by first drawing a bar of the grate (which is moveable) on each side of the pot, and forcing all the fuel into the ash pit; a pair of tongs is then made to encircle the pot, to which is attached a lever, by which the pot is lifted upon the top of the furnace. The pot is then carried, in another pair of tongs, and its contents poured into two moulds, which produce two bars of 10 inches long, 7 inches wide, and 1 inch thick. The pot is returned to the furnace, the bars that were withdrawn replaced, and the ignited fuel put round the pot, and charged with more gold. A pot, by proper treatment, may be used eight or ten times in the course of a day.

From each pot melted, two pieces or samples are cut, one from the first poured bar, the other from the second. These are put in papers, marked accordingly by the surveyor of the meltings, who delivers them wrapt up in a slip of paper, which contains the numbers of the ingots of which the pot was composed, their gross weight, with the quantity of alloy or fine gold, as it may happen, which was added in the melting. The bars of gold, after being weighed by the melter for his own satisfaction, are placed in the strong-hold, under the key of the surveyor of the meltings, until the King's assay-master has reported their standard quality. If they are found to be the proper standard, he sends a written order, authorizing them to be delivered to the moneyers, for the purpose of making coin.

When the bars are delivered to the moneyers for coinage, they are carried by the melter to the office of receipt and delivery; where they are weighed by the weigher and teller, in the presence of one of the check officers, one of the moneyers, and the melter.

The moneyer gives a receipt in the pot-book to the melter for the gold so delivered, and the same is placed to the credit of his account in the books of the deputy-master, comptroller, and King's clerk. The same process is gone through when the moneyers return the portions of the gold, commonly called scissell, which they cannot make into money, and for the weight of which the melter gives a receipt in the pot-book, which is placed to the credit of the moneyers, and debit of the melter's account.

Silver.

When silver bullion is imported into the mint, it passes through the same preliminary stages that we have seen the gold pass. The weight of an ingot of silver is from 50 to 60 lbs. Troy; they are numbered, assayed, weighed before the importers, and potted for melting the same as in gold. The only difference is in the pots, weighing from 400 lbs. to 450 Troy lbs. each. The silver is reported in ozs. and dwts.; and the standard computed to that of 11 ozs. 2 dwts. of fine silver, and 18 dwts. alloy. The pots are melted under the inspection and superintendence of the surveyor of the meltings; in every respect the same as the gold, excepting that three samples are taken for the assay, one from the first, the middle and last poured bar of each pot.

The process of melting silver, now practised at the Royal Mint, is a recent invention, and a very great improvement. The usual mode was to melt it in black lead pots, and a considerable coinage of tokens for the bank of Ireland was performed with the meltings done in this way. The importations being entirely Spanish dollars, and the tokens of that standard, the melter could easily melt them in quantities of 60 lbs. Troy, which was done. The inconvenience of this mode was severely felt, because ingots of silver of various qualities could not be imported for coinage, from the difficulty of not being able to blend several together in one pot, so as to produce the proper standard of our money. So sensible was government of this imperfection in the mint, that, in the year 1777, Mr Alchorne, then master's assay-master, was sent to visit the mints of Paris, Rouen, Lille, and Bruxelles, and to collect information as to the arts of coining practised in those mints, and particularly the art of melting silver in large quantities. Mr Alchorne's intimate knowledge of the English mint, together with his various and extensive knowledge as a practical chemist, well fitted him for the important undertaking; and his observations on the coin and coinage of France and Flanders is exceedingly creditable to his judgment and knowledge.

It is worthy of remark, that it is on record in the books of the mint, that, in the recoinage of King William III. the pots of silver weighed 400 lbs. Troy and upwards; but every trace as to how this quantity of silver was melted is completely lost; and it is only conjectured that it was done in pots made of wrought-iron. But not a vestige of a melting furnace, fitted for such a purpose, is to be found in the Tower, nor a single record of the method practised.

In the year 1758, some trials for melting silver in wrought-iron pots took place, by means of a blast-furnace, but they were found so laborious, inconvenient, and profitless, as to cause the process to be abandoned.

In 1787, when some silver was imported into the mint for coinage, new experiments were made by the late Mr Morrison, then deputy-master and worker, and who conducted the meltings. A blast-furnace was again tried and abandoned. He next attempted to melt the silver in large black lead pots, containing from 100 to 120 lbs. Troy; but the repeated breaking of the pots, although it was attempted to guard them by outside luting, proved a great interruption to the business, and serious loss to the melter. Trial indeed was made with cast-iron pots; but these were found subject to melt, and the iron got mixed with the silver. The work too was continually stopped by the King's assayer, in consequence of the metal not being of the proper standard, it being always refined by the process of melting, and lading it with ladles from the pot.

Independent of these considerations, very great difficulty arose at the office in arranging the potting, previous to the operation. The practice pursued at the mint (in order to reduce the metal to standard), of combining and blending the various ingots of better and inferior qualities, adding what little portion of alloy or fine metal that might be necessary to obtain accuracy, rendered it impossible, where the ingots weighed from 60 to 80 lbs. Troy, to pot them of a weight not exceeding 100 lbs. Troy. It therefore became necessary, in the first place, to reduce the larger description of ingots to a smaller size by melting, and these were again weighed into the office of receipt. Hence a double operation took place, occasioning additional labour, waste, and expence to the melter, and requiring extraordinary trouble and attendance on the part of the office. It was very obvious that this mode of conducting the silver meltings was extremely defective, and was in consequence abandoned.

The next experiments made were with a reverberatory furnace, built after the model of those used in the Lille mint. But no better success attended these trials, and the process was, as in former cases, abandoned. The imperfection here arose from the great refinement of the silver in the melting, by the oxidation of the alloy, and which the usage of the British mint does not allow the melter to supply, as in the French mints. In the French mints, as soon as the silver is in fusion, a sample is taken out and assayed, and copper is added in the proportion to the refinement of the melted silver (which is kept in fusion while the assay is making); the whole is well stirred, and immediately laded out and cast into bars.

In the years 1795 and 1798, several farther trials were made by the late Mr Morrison, who was indefatigable in his endeavours to perfect his department, with a view to attain the object so much desired,—that of melting large quantities of silver at once, without producing so much waste and refinement in the metal. In these experiments he tried three furnaces, each of a different construction; and though he was much nearer his point, there was still an imperfection, arising from the mode of dipping out the metal from the pot with ladles, which chilled the metal, and rendered the process extremely laborious and tedious.

No new experiments were made until the year 1804. Mr Morrison, having died in 1803, was succeeded in his office by his son, the present deputy-master and worker of the mint. The extreme scarcity and defective state of the silver coin at this time, arising from the defective state of the melting department, urged Mr Morrison to renew the experiments of his father. In following these experiments, Mr Morrison had in view the construction of a furnace adapted for the use of cast-iron pots,—the use of pots of a size capable of melting from 400 to 500 lbs. Troy, at one charge,—the adaptation of such machinery as would supersede the clumsy and wasteful process of lading the silver from the pots when melted,—and, lastly, the introduction of the use of moulds made of cast-iron, in place of those then used in the mint, and which were made of sand.

In all these objects Mr Morrison, highly to his credit, perfectly succeeded; and the silver melting department of the new mint was constructed according to the furnace first used in the experiments which led to such a satisfactory result. The whole has been in use since 1811, and the department is capable of melting, with ease, 10,000 lbs. Troy of silver daily; as was done for several months during the late recoinage. (1817.)

We shall now proceed to a description of the machinery and furnaces of the silver melting department, together with the mode of conducting the process.

The upper part of Plate LXI. is a perspective view of the machine, for pouring the melted silver into the ingot moulds.

Fig. 1. AA, are the furnaces in which the metal is melted. These are air-furnaces, built of fire-brick, in the usual manner of melting furnaces, but, to render them more durable, the brick-work is cased in cast-iron plates, which are put together with screws. BB are the covers to the furnace; they are held down to the top plate of the furnaces by a single screw-pin for each; and, on the opposite side of the cover, a handle *a* is fixed. By pushing this handle, the cover is moved sideways upon its centre-pin, so as to remove it from the furnace mouth. A roller is fitted to the cover, to run upon the top plate, and render the motion easy.

The interior figure of each furnace is circular, 30 inches deep, and 21 inches in diameter; the bottom is a grate of cast-iron bars (each bar being moveable) to admit the air. Upon the grate is placed a pedestal or stand of cast-iron, of a concave shape, covered an inch thick with coke or charcoal dust, and upon which the pot is placed in which the silver is melted. The pedestal is nearly two inches thick, and is fully two inches broader in its diameter than the pot, the object of which is to protect the hip of the pot from the very high heat which the current of air ascending through the grate, when the furnace is at work, creates, and which would otherwise melt the pot. This precaution is essentially necessary, from the pedestal raising the pot so considerably above the grate, and from its being entirely surrounded by the fire in the furnace. If the furnace, however, is properly managed, there is no risk of melting the pot. On the top or mouth of the pot is placed a muffle, which is a ring of cast-iron, six inches deep, made to fit neatly into the mouth of the pot; the use of this muffle is similar to that used in melting gold, to give a greater depth of fuel in the furnace than the mere length of the pot, and which gives a greater degree of perfection to the process. The muffle is also extremely convenient, by giving a depth to the pot, if we may so speak, which enables ingots of silver to be charged, which are longer than the depth of the interior of the pot. The top of the ring or muffle is covered with a plate of cast-iron, to prevent the fuel from falling into the pot, and secure the metal from the action of the atmospheric air when in fusion. Each furnace has a flue 9 inches wide and 6 inches deep. The flue is 4 inches from the top of the furnace, and proceeds in a horizontal direction, and extends to the flue C, which is 9 inches square, and is carried up in a sloping direction to the stack or chimney, which is 45 feet high from the grate of the furnace.

When the furnace doors, BB, are closed, the current of air which enters at the grate ascends through the body of the furnace, and causes the fuel, which is coke, and which surrounds the melting pot, to burn very intensely. The degree of heat wanted, however, is very nicely regulated by a damper, which is fixed in the flue of each furnace, and exactly fitting the square of the flue, so that any portion of draught can be given to the furnace that may be wanted. The damper is a plate of wrought iron, fixed in a frame, and is easily moved in and out, so as to increase or diminish the size of the flue. It is fixed in the brick work of the sloping flue C, about 18 inches above the top of the furnace. The furnace doors B have small holes in them to look into the furnace; these are closed by stoppers or plugs of cast-iron.

When the furnace is put to work, it is lighted by some ignited charcoal being put upon the grate, and around the pot (for the pot is always in its place before the fire is lighted); upon the charcoal about three inches deep of coke is put—the door B is shut, and the damper is pulled out about two inches. When the coke is ignited, a similar quantity is put on, and so continued until the furnace is filled with ignited coke. The object of this precaution is to prevent the cracking of the cast-iron pot by being too suddenly heated—and it is generally about two hours before the pot can be brought to a charging heat, to do it with perfect safety. Before the silver is charged the pot is heated a bright red; it is then examined to see if it has cracked in bringing up, as it is technically called. This is done by placing a cold iron tool of considerable thickness in the centre of the pot, which immediately renders any crack visible to the eye. When satisfied that the pot is sound the silver is charged into the pot. With the silver is put into the pot a small quantity of coarsely grained charcoal powder, which coats the inner surface of the pot, and prevents the silver from adhering to it. When the silver is brought to the fusing point, the quantity of charcoal is increased until it is nearly half an inch deep on the surface of the silver, and which keeps the silver as much as possible from the action of the common air, and prevents that destruction of the alloy which would otherwise cause a considerable refinement in the metal. When the silver is completely and properly melted, it is well stirred with an iron stirrer, so as to make the whole mass of one uniform standard quality. The pot is then taken out of the furnace by the crane and conveyed to the pouring machine, by which its contents are poured into the ingot moulds.

Fig. 3. is the crane; it is supported by a strong column of cast-iron X, which is firmly fixed in masonry beneath the floor. The gibet of the crane marked WY is cast in one piece; it has a collar at *e* which fits upon a pivot formed at the upper end of the column X. At the lower part of the gib is a collar which embraces the column near its base. On these two supports the gib turns freely round, so that its extremity W may be placed over either of the furnaces BB. The wheel-work of the crane is supported in two frames *zz*. which are fixed to the gib by three bolts; it consists of a cog-wheel *c*, upon the end of the barrel, on which the chain winds, and a pinion *b*, which gives motion to the cog-wheel. The axis of the pinion has a winch or handle (*a*) at each end to turn it round. The chain *d*, from the barrel, is carried up over the pully at *c*, which is fitted in a part of the gib immediately over the pivot at the top of the column X. The chain then passes over the pully W at the end of the gib, and has the tongs VT suspended to it. These are adapted to take up the pot between the hooks or claws T, at the lower ends. The two limbs are united by a joint like shears, and the upper ends V, are connected with the great chain by a few links. The pot has a projecting rim round the edge, and the tongs take this rim to lift the pot out of the furnace. The pot being wound up to the required height, by turning the handle *a*; the gib of the crane is swung round to bring the pot over the pouring machine, and it is lowered down into it, for the convenience of swinging the crane round a worm, which is fixed upon the column X at O, and a worm or endless screw is mounted in the frame *z* to work in the teeth of the wheel. The screw being turned by a winch on the end of its spindle will cause the gib to move round on the column.

Fig. 2. represents that part of the pouring machine in which the pot is placed. M is an axis which is mounted in the frame of fig. 1. by the pivots at its ends. To this axis is fixed a cradle, which receives the pot. The cradle is jointed together so as to open and shut, and the screw *m* draws the parts together until they will fit. The pot L is an arched rack, forming a continuation of the principal bars of the cradle. When the cradle is in its place, as in fig. 1. the rack L is engaged by a pinion K, and can thereby be elevated so as to pour out the metal at a lip or spout which is made in the edge of the pot for that purpose. The axis of the pinion K is turned by means of a winch D with a train of wheels DE, FG, and HI. The man who turns this winch stands before the pot, so as to see what he is doing. The frame of the pouring machine is sufficiently evident from the figure. It is so made as to leave an open space beneath for the carriage containing the ingot moulds.

Fig. 4. is a separate view of a pair of ingot moulds. The two parts R and S put together, and form a complete mould, as shown in fig. 5. The upper edge or mouth is a little enlarged to facilitate the pouring of the metal. The moulds are made of cast-iron. The part R has the bottom and one side formed on it, and the other half S has one side formed on it. Before the moulds are used, they are heated in an iron closet, which has flues surrounding it, and they are then rubbed on the inside with linseed oil.

PQ, fig. 1. is the carriage into which a row of these moulds are placed, as shown at 4, and they are screwed up close by two screws *pp*, so as to hold them tight; the moulds rest upon a plate, which is suspended by screws *q*, at each end, and can by that means be raised or lowered to suit different heights of moulds. The carriage is supported on four wheels QQ, which run upon a railway. PP is a rack fixed to the bottom plate of the carriage; in this rack a cog-wheel N, acts; the cog-wheel is turned by a pinion which has a handle O, fixed upon it; by turning the handle the carriage is moved along upon the rail-way; and any one of the moulds 4, can be brought under the spout of the pot 2: then, by turning the handle D, the pot can be inclined so as to pour the metal into the mould until it is full.

In the silver melting-house there are eight melting furnaces, two cranes, and two pouring machines. Each crane stands in the centre of four furnaces, freely commanding the centre of each, and conveys the pots to the pouring machine. The eight furnaces are worked three times daily, and each pot contains, upon an average, 420 lbs. Troy, making the total melting 10,080 lbs. There are four men to each four furnaces; each party pour their own pots, and the whole meltings are finished from the time of first charging in the morning, in little more than ten hours.

The whole of the silver meltings, as we before observed, are conducted under the superintendence of the surveyor of the meltings; and he allows no silver to be delivered to the company of moneyers by the melter, unless he has a written order from the King's assayer master, authorizing such delivery.

The meltings are performed by contract with the master of the mint and his first clerk, as melter. He is responsible to the master for all the bullion he receives, and delivers weight for weight, which renders his situation one of considerable risk and great responsibility. He also finds security for the due performance of the duties of his office.

The bars of silver, of the approved standard, are delivered over to the moneyers, in the same manner as we have detailed respecting gold. The moneyers also perform the various processes of the coinage under contract with the master of the mint, always delivering weight for weight. They also give security for the due performance of the duties of their office.

Operation of Rolling.

The first process to which the silver bars are subjected, is that of flatting, rolling, or laminating, in the rolling mill. The bars, before they are put through the rollers, are heated to redness, which makes them much easier rolled. They are heated in a reverberatory furnace.

When the gold bars are subjected to the same process, they are rolled cold, and a bar of an inch thick can be reduced to the thickness of a half sovereign without ever being annealed, and could be reduced much thinner if necessary, and not show the least symptom of cracking.

Fig. 6. is an elevation of one pair of rollers, and the wheel work for giving motion to them. A is the upper and B the lower roller; CC are the standards of the cast-iron frame which supports them. Each of these standards has a opening in it to receive the bearing brasses for the pivots of the rollers. The upper roller is suspended in brasses which are regulated by the large screws FF, which admit of placing the rollers at a greater or less distance asunder. This is shown by the separate figure of one of the screws; *hh* are the brasses, and *k* the hole to receive the pivot of the roller. On the upper part of the screw a collar *f* is fitted, and from this two bolts *gg* de-

COINING.

PLATE LXIII.

MACHINES used in the MINT.

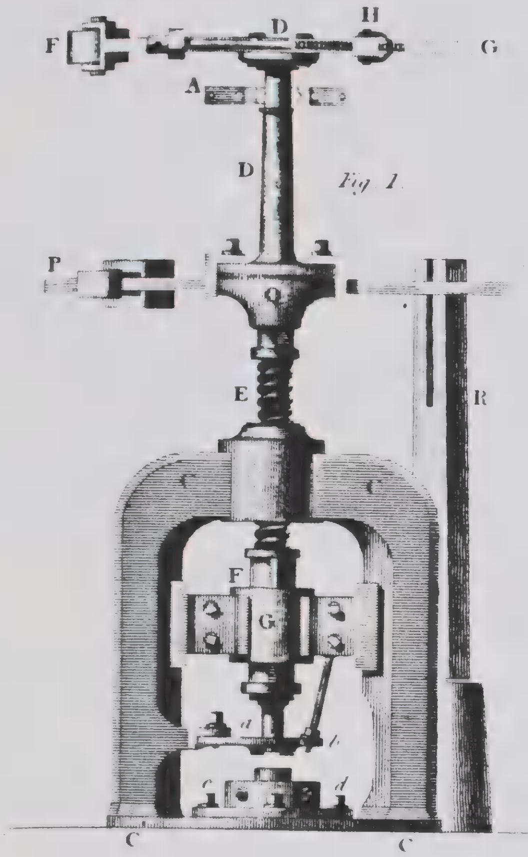


Fig. 1.

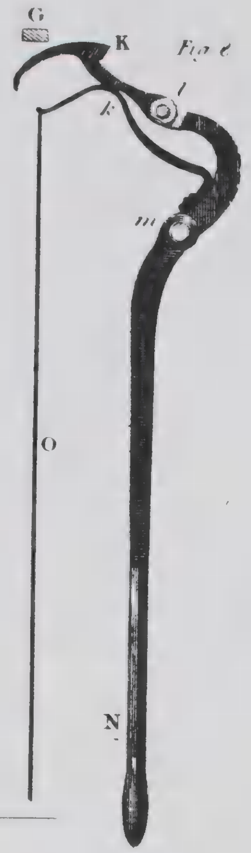


Fig. 8

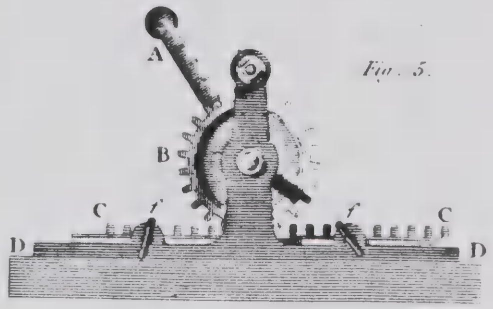


Fig. 5.

Milling.

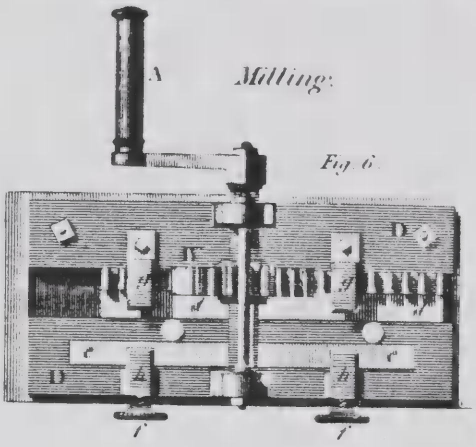


Fig. 6.

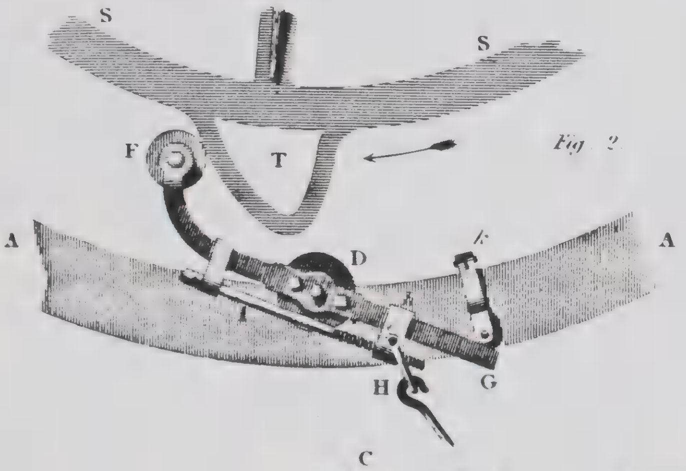


Fig. 2

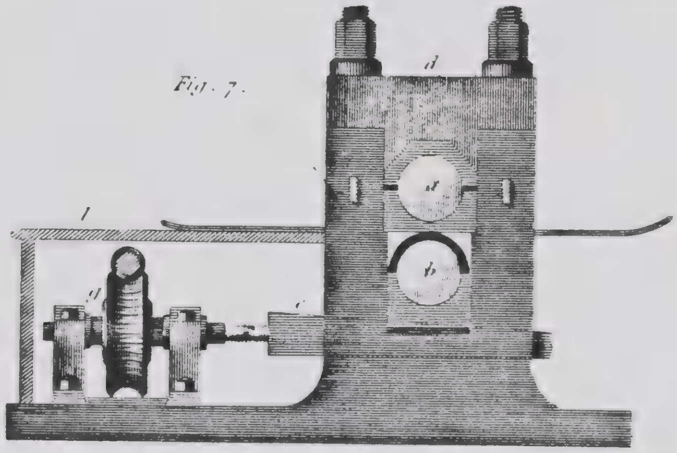


Fig. 7.

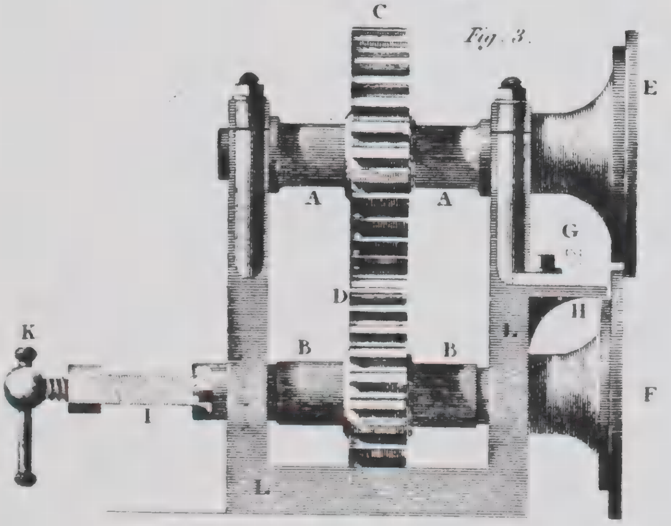
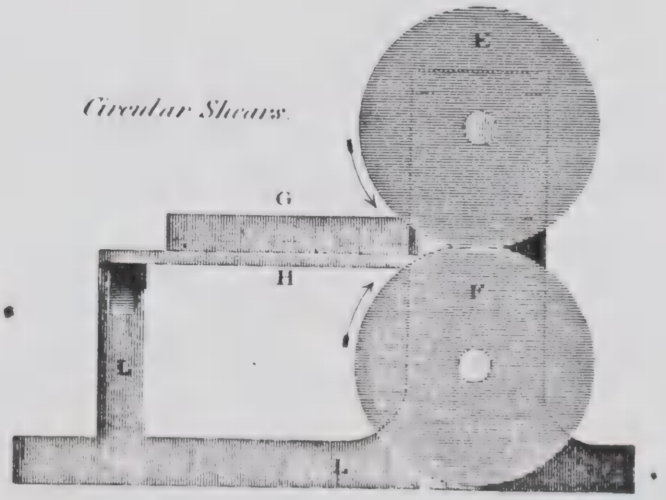


Fig. 3.

Fig. 4.

Circular Shears.



J. Farey delin.

E. Turrell Sc.

Published by A. Constable & Co. Edinr. 1818.

scend, and are fastened to the brasses *hh*, with nuts beneath. By these the roller is suspended, but, by turning the screw round, the brasses rise or fall. The brasses *hh* are fitted very accurately into the grooves on openings in the standards CC.

For the convenience of turning both screws round together, each has a cog-wheel F fixed on the upper end of it. These are turned by two worms HH, fixed on a common axis, which has a handle G in front. See the plan, fig. 8. By turning this handle the upper roller is either raised or lowered, as is required, but will always be parallel to the lower one. The two standards CC, are firmly bolted down to the ground sills DD, which are of cast-iron, and are bedded in the masonry EE. The standards are farther united by bolts *a*. At the upper part S, is a cross bar fixed between the standards, to support a small table or platform, on which the metal is placed when it is to be presented to the rollers.

The rollers are put in motion by a steam-engine. The crank of the engine has a cog-wheel upon it which turns a pinion. Upon the axis of this is a very heavy fly-wheel, which turns with great velocity. On the end of the same axis, is a pinion which turns a large wheel M, and this gives motion to a long shaft NN, which extends beneath the rollers, and is continued a sufficient distance in the same direction, to turn two pair of rollers, one of which only are represented in the drawing. At L, a wheel is fixed on this shaft, to turn the upper roller A, by means of a wheel K, which is supported in the standards *kk*, and its axis is connected with a short shaft *r*I*r*, with the square on the end of the roller A. *rr* Are the sockets by which the shafts are joined, and they admit of a little yielding when the roller is raised.

The wheel O, is fixed on the shaft N, to turn the lower roller B, by means of the wheel P; but the wheels P and O do not touch, being of smaller diameters, and an intermediate wheel is applied on one side, so that its teeth engage with both the wheels O and P; by this means the two rollers A and B are made to turn round in opposite directions, and then their adjacent surfaces will move together. The wheel P is supported in standards *pp*, and its axis R is connected by a shaft Q, with the lower roller B.

Fig. 7. is a gauge so ascertain the thickness of the plates, which are reduced by the operation of the rollers; it consists of two steel rulers, fixed fast together at one end, and the other end is a certain distance asunder, forming an opening between them, which gradually diminishes to nothing. The sides of the rulers are divided. In using this gauge to determine the thickness of a piece of plate, the edge of the plate is applied to the opening between the rulers, and the divisions of the rulers show the distance it will go into the opening before it fits tight, and the thickness is ascertained by the number of the divisions.

Plate LXIII., figs. 3. and 4., represent the machine by which the plates of metal from the rolling-mill are cut into slips of a convenient width, for cutting out the circular pieces or blanks, which are to form the coin. This width is generally that of 2 crowns, 2½ crowns, shillings, &c.

LL is a strong iron frame, which is screwed down to the ground sills of the mill, so that the cog-wheel D will be immediately over the shaft which turns the rolling-mill, and can be turned by a cog-wheel upon that shaft. The cog-wheel D is fixed upon an horizontal axis BB, which is supported in the frame LL. AA is a similar axis placed at the top of the frame, and turned round by a cog-wheel C, which engages with the wheel D. On the extreme end of each axis A and B, a wheel or circular cutters E and F is fixed. The edges of these cutters lie in close contact laterally, and overlap each other a little. The edges of the cutters are made of steel hardened, and they are turned very truly circular, and the edges which overlap are made very true and square. Whilst they are turning round, if the edge of a plate of metal is presented to them, it will be cut or divided just in the same manner as a pair of shears. H is a narrow shelf, upon which the plate is supported when it is pushed forwards to be cut, and G is a guide fixed upon the shelf; the edge of the plate of metal is applied against this guide, whilst it is moved forwards to the cutters. The guide is moveable, and the distance which it stands back from the cutting edges, or line of contact of the two cutters, EF, determines the breadth of the slip of metal which will be cut off.

To give these slips of metal the exact thickness which is requisite before they are cut up into blocks, they are subjected to a more delicate rolling; or they are drawn between dies by a machine, invented by Mr Barton, the present comptroller of the mint.

Fig. 7. Plate LXIII. represents the finishing rollers, viewed at the end of the frame, in order to show the manner of adjusting them; for it is only in those parts that they differ from the great rollers: *a* is one of the pivots or centres of the upper roller; it is accurately fitted in a collar of brasses, which collar is held down in a cell at the top of the standard by a cap *d*, with two bolts and nuts. These are not intended for the adjustment of the rollers as in the former instance, but the lower roller is moved for this purpose. The pivot *b*, of the lower roller, is received in a brass bearing, which is moveable, in the opening in the standard frame. The brass rests upon a wedge, *e*, which is fitted in a cross mortice through the standard. By forcing the wedge farther in the brass of the lower roller, it will be moved nearer to the upper roller. The standard at the other end of the rollers is made in the same manner, and the wedges of both must be moved at the same time. To give them motion, a screw, *f*, is fitted into each wedge, and upon these screws are worm wheels, *g*, which are both moved by worms cut upon an horizontal axis, then extends across from one side of the frame to the other, and has a handle at the end to turn it round by, and move the screws and wedges both in equal quantity; *l* is the table on which the metal is laid to present it to the rollers.

Plate LXII. contains drawings of Mr Barton's new machine for drawing the slips of metal between dies, by which a greater degree of accuracy is obtained in the thickness of the metal; the operation is similar to wire drawing.

Figs. 1. 2. and 3. represents a small machine for thinning the ends of the slips of metal, so that they will enter into the dies, through which the whole of the slip is to be drawn. It is a small pair of rollers, which are shown on a large scale, in fig. 1.; A is the upper roller, and B the lower: this has three flat sides, as represented; C is the slip of metal put between the rollers; D is a stop adjustable in the line of the motion of the slip of metal C. Fig. 2. is an end view, and fig. 3. a side view of the frame or machine in which the rollers are mounted. AB are the rollers, which are made to turn round together by pinions *a b*. F is a large cog wheel, which is fixed on the end of the axis of the lower roller. This cog-wheel is turned by a pinion G, which is fixed on an axis extended across the machine, and having a fly-wheel fixed on one end, and at the other a drum H, to receive an endless strap, by which the machine is put in motion; a crank is formed on the middle of this axis, and a rod *d*, is joined to the crank, to connect it with the moving blade K of a pair of shears, of which the other blade L is fixed to the frame. The distance of the rollers is regulated by a screw *ee*, at the top of each standard. These screws have pinions at the top of them, and are turned round by a pinion which is placed between them, and engages the teeth of both pinions, so as to give motion to the two screws at the same time, when the middle wheel is turned round by a cross handle which is fixed to the top of it. If the slips of metal which are to be put in this machine are not exactly square at the ends, they are cut off smooth and square by the shears, which keep constantly moving; the end of the slip is then presented between the rollers, not on that side which would draw them in between the rollers, as in common rolling, but on the opposite side; when one of the flat sides of the lower roller comes opposite to the upper roller, then the piece of metal can be pushed forwards between the two, until the end stops against the stop D, as in fig. 1.; then as the rollers turn round, and the flat side of the lower roller passed by, the cylindrical parts of the roller will take the metal between, and roll it thinner at the end which is between the stops and the point of contact of the rollers.

Fig. 5. is a perspective view of the drawing machine at work.

Fig. 7. and 8. a section to show how the slip of metal C is drawn between the dies by the tongs, fig. 7.

Fig 4. is a section of the steel dies. They are two cylinders AB of steel, made very hard and extremely true; these are fitted into two sliders DD, and are held fast by clamp pieces EE screwed against them. The steel cylinders are very accurately fitted into their beds in the slides, so that the steel shall be firmly supported and prevented from bending or turning round, and presenting but a small portion of their circumference against the slip of metal. The sliders D are fitted into a box, fig. 8. and 9.; they fit flat on the bottom of the box, and two clamps FF are screwed against the sliders to confine them to the box. The lower slider is supported by two screws *ff*, and the upper slider is forced down by a large screw G; this has a cog-wheel fixed on the top of it, with a pinion and lever to turn the screws round very slowly, and regulate the distance between the dies. H is a clamping nut, fitted upon the screw, to take off all possibility of shake; the sliders are also bound fast sideways by screws tapped through the sides of the box, the points of which press upon steel plates between them and the sliders. In order to render the contact between the points of the screws, supporting the under slider and the point of the adjusting screw, forcing the upper slider, still more complete, two extending screws are introduced at the ends of the steel dies between the sliders, by which a sufficient degree of contact, to overcome the spring of the materials, may be excited before the dies come into action on the slip of the metal.

The box of dies is fixed at one end of a long frame, as is shown in fig. 5. This frame supports two axis, AA, one at each end. Upon these axis wheels are fixed to receive endless chains, BB, which move along a sort of trough or railway, formed on the top of the frame. The chains are kept in motion by a cog-wheel C, which is fixed upon the axis most remote from the box of dies. This cog-wheel is turned by a pinion D, on the axis of which is a wheel E, and this wheel is turned by a pinion F, on the axis of the drum G, which is moved by an endless band proceeding from some of the wheels in the mill, and which is thrown in and out of geer at pleasure by a tightening roller. The slip of metal is drawn through the dies by the chain, with a pair of tongs, fig. 6. and 7. *ab* are the two jaws of the tongs which are united with each other by the joint pin *c*. This has a small roller or wheel fitted on each end to run upon the railway on the top of the frame; *dd* are a similar pair of wheels, the axle of which is connected with two links *ee*; this axle passes between the tails of the tongs, but is not fixed to them. The ends of the links have a double hook formed on them as shown at fig. 7. The tongs run upon their wheels immediately over the endless chain, so that when the end *f* of the links *ee* is pressed down, one of the hooks catches on a cross pin of the chain, as in fig. 7. The axle of the wheels *dd*, acting between the inclined parts of the tails of the tongs, tends to throw them asunder, and, at the same time, the jaws of the tongs bite with very great force; the links *ee* draw the tongs along with the chain BB. The links are carried a long way beyond the axle of the wheels, and have a sufficient weight *h* fastened to them, which will lift up the hooked end *f*, and disengage it from the chain, except when there is a considerable strain on the tongs.

To use this machine, a boy takes hold of the tongs by the handle *r*, when they are disengaged from the chain, and pushes the tongs forward towards the box of dies. The tongs run freely upon their wheels, and the jaws open when moved in that direction, because two small pins *ii* are fixed across between the links, and acting on the outsides of the tails of the tongs, close them together, and this at the same time opens the jaws. The tongs are pushed up close to the box of dies, and the jaws enter into a recess N, fig. 8. which is formed for that purpose. Another boy takes a slip of metal, which is previously made thin by the rollers, fig. 1., and introduces it between the dies, and also between the jaws of the tongs, which are open. The boy who holds the tongs now takes the handle *s*, which is fixed on the back of the tongs, and holds it fast, whilst with the other hand he draws the handle *r*, at the end of the links, away from the tongs. This has the effect of closing the jaws of the tongs upon the slip of metal between them; at the same time he depresses the handle *r*, and the hook at the end of the links *ee* will be caught by the first cross pin of the chain, which comes beneath them. This puts the tongs in motion, but the first action is to close the jaws and bite the piece of metal with great force, in consequence of the axletree of the wheels being placed between the inclined planes of the tongs. When the tongs have closed on the metal, with all their force, they move with the chain, and draw the slips of metal through the dies, which operating upon the thicker parts of the slip with greater effect than upon the thin, reduces the whole to an equable thickness. When the whole length is drawn through, the strain upon the tongs is instantly released; and the weight lifting up the hook at the other end of the links, they are ready to be advanced again to the dies, to draw another bar. The frame, fig. 5. contains two pair of dies, and the same wheel serves for both. At the mint are two machines like that shown in fig. 5. They are placed side by side, with a sufficient space for the boys to work between them.

These machines were made by Mr Maudslay, under the directions of the inventor.

The slips of metal produced from this machine are considerably more uniform in thickness than when finished at the adjusting rollers; consequently the individual pieces are made more nearly to the standard weight, which was the object in view by this invention. This has become a point of great importance in the practice of the mint, from the remedy on gold in weight being reduced from 40 to 12 Troy grains. When the pieces cut from slips of metal prepared by the drawing-machine are pounded and weighed, which is telling the number of pieces in a pound Troy, sovereigns or half-sovereigns, the variations from standard either way seldom exceed 3 grains Troy. It is reckoned good work from the adjusting rollers when the variations are under 6 Troy grains.

The plates of metal, prepared by the adjusting rollers or the drawing machine, are cut out into circular pieces nearly of the size of the intended coin. This is done by the cutting out press, fig. 1. Plate LXIII. CCCC is a cast-iron frame which is fixed on a stone basement. E is the screw which is fitted through the top of the frame and actuates a slider F. At the lower end of the slider a steel punch *a*, is fixed. Its diameter is exactly equal to that of the pieces which are to be cut out, *c* is the steel die, which has a hole in it of a proper size to fit the steel punch; *d* is a box with screws for adjusting the die, so that the hole in it will be exactly beneath the punch.

The slider F is fitted into a socket G, which guides it so that it will descend correctly into the hole in the die. *b* is a piece of iron which is fixed a small distance above the die *c*; it has a hole through to admit the punch. Its use is to hold down the piece of metal when the punch rises, otherwise the piece would stick to the punch.

On the upper end of the screw a piece Q is fixed, and an arm projects from it with a weight P at the end; and it is this weight which gives the necessary momentum to punch out the piece. D is a spindle fixed upon the piece Q in the line of the screw; it is supported in a collar A, at the upper end, and above the collar a lever DGF is fixed; at one extremity of this lever a roller F is fixed, and this is acted upon by projecting teeth, which are fixed in the rim of a large horizontal wheel, which is turned round by the power of the mill. This action is explained by fig. 2. which is an horizontal plan of the upper part of the axis. SS is part of the rim of the large wheel, and T one of the projecting cogs, which, when the wheel turns in the direction of the arrow, will take the roller F, at the end of the lever FD, and turn the lever round in that direction, which will wind up the screw and raise the punch out of the die. Also this action draws a rod H, which is connected with the lever by a joint; the other end of this rod is connected with a bended lever, from the other arm of which a rod descends and has a piston fixed to it. This piston is fitted into a close cylinder; hence, when the piston is drawn up, it makes a vacuum in the cylinder, and the pressure of the atmosphere on the piston causes a reaction, and the instant that the roller F escapes or slips off from the tooth T, the reaction of the piston draws the joint H back, and makes the screw turn round in that direction, which causes the punch to descend into the die, and it will pierce out a piece from a plate of silver or gold which is laid upon the die, which piece will be exactly the size of the punch, which, as before mentioned, is the same as the intended piece of money. When the machine requires to be stopped, a catch K, is suffered to rise up and hook the lever G, so that it cannot return by the action of the exhausted cylinder and pierce the plate. This catch is shown in fig. 8. At K it is moveable on a joint *l*, and is thrown upwards by a spring *k*. To this spring a cord O is fastened, and the lower end of the cord has a tradle fastened to it. The boy who applies the plates of metal to this machine places his foot upon the tradle, and draws down the spring and the catch K, and then the machine will make a cut every time that a cog T of the great wheel S passes by; but if the boy relieves the tradle, then the spring K lifts up the catch *k*, as in fig. 8., and when the end of the lever G comes over the catch, it will be caught thereby, and held fast from returning by the action of the exhausted cylinder. The joint *l* of the catch K is made at the top of a long lever *l*N, of which *m* is the centre pin, when the lever G is detained by the catch K; if the end N of the lever is drawn towards fig. 1. it draws the lever G still farther, so that the roller F will be raised quite clear of the tooth T of the great wheel, and prevents any unnecessary wear of the machinery when the process is stopped.

Twelve of the cutting-out presses, fig. 1. are arranged in a circle round the great wheel SS, which is turned by a steam-engine, and has a large fly-wheel fixed upon the same axis, just above the wheel S, to regulate the motion. The stone basement on which the presses are fixed is circular, and the bearing A are all fixed in a circular iron frame, which is erected upon the stone basement by an iron column placed between each press. The whole forms a very handsome colonnade, and is placed in the centre of a circular room, which is lighted by a sky-light in the dome. The air-cylinders are concealed within hollow pilasters, which ornament the walls of the room, and appear to support the dome. The rod H is jointed to a piece *h*, which is fitted to slide upon the lever FG, and is moved by the screw I, so as to be fixed at any required distance from the centre, and give a greater or lesser effect to the reaction of the exhausted cylinder. R, fig. 1. is a strong wooden spring, against which the balance weight P strikes to stop its motion, when it has made its required stroke to pierce the plate.

This cutting-out machine was invented by the celebrated Matthew Boulton of Soho, who had a patent for it in 1790, and prepared it at that time for working the coining or striking presses, but having invented a better method of working the latter, he confined this plan to the smaller presses for cutting out the blanks.

The blanks after being cut out by the last mentioned machine, are carried to the sizing-room, where each individual piece is adjusted to its standard weight. The light pieces are selected for remelting: and the heavy ones, if not considerably beyond weight, are reduced to their standard weight by rasping their surfaces with a coarse rasp or file. The superior accuracy of Mr Barton's beautiful machine has considerably abridged the labour of this inelegant and unmechanical process.

The pieces thus adjusted, are in a state of great hardness from compression by the rolling and drawing processes, and by which, in fact, their latent heat has been squeezed out. They attain their softness again by being heated to a cherry red heat in a reverberatory furnace; after which, they are boiled in very weak sulphuric acid, which makes them very clean, and of a very white colour. When dried, either in warm saw dust, or over a very slow fire, they are in a state for the two next processes, which are the milling, and the coining or stamping.

Operation of Milling.

The operation of milling is to be performed round the edge, to prevent their being clipped or filed (which was a fraud commonly practised upon the ancient money made before the introduction of milling or lettering round the edge). The construction of the milling-machine will be easily understood from the inspection of fig. 5. and 6. Plate LXIII.; fig. 5. being an elevation, and fig. 6. a plan of the same. The parts which operate upon the piece of money, consist of two steel bars or rulers, *dd* and *ee*, the adjacent edges of which are cut or fluted. The bar *ee* is immoveable, being fastened down by two clamps *hh* to a cast-iron plate DD, forming the base of the whole machine; the other bar *dd* is prevented from rising by the pieces *gg*, but has the liberty of moving backwards and forwards in the direction of its length, and is guided in such motion by laying half its thickness in a grove formed in the plate DD. A rack CC is fixed to the moving ruler, which engages in the teeth of the wheel B, mounted on an axis lying across at right angles to the ruler, and supported at its ends by two standards rising up from the Plate DD. On one end of the axis, a handle is fixed for giving motion to the machine. Two blanks are put into the machine at the same time, as shown at fig. 6., and the ruler *ee* can be made to approach nearer or recede farther from the ruler *dd* by the two screws *ff*, to take in a different sized piece between them. The operation of the machine is very simple. Two blanks being placed between the edges of the rulers, the handle A is turned round half a turn, which moves the ruler *dd* endways, sufficient to mark the blank all round the edge. The two milled pieces are then taken out, and two other blanks are placed between the rulers; the handle A being turned half round in an opposite direction, carries the ruler *dd* back again to the position in which it first stood: thus two more blanks are milled, and so on. The machine is placed upon a strong wooden bench, to raise it to a convenient height for the man who turns the handle; the blanks are placed in the machine by a boy who is stationed on the opposite side to that where the handle is.

Operation of Stamping.

Plate LXIV. is the coining-press, which stamps the money. Fig. 1. is an elevation of the press; CC B is a strong cast-iron frame, which is firmly screwed down upon a stone basement by the screws *cc*; the upper part B is perforated perpendicularly to receive the screw DD. One of the steel dies which strike the coin, is fixed to the lower end of this screw by a box, 4, and the other die is fixed in a box, 6, which is fastened down upon the base of the press. The heavy balance weights RR, are fixed on the top of the screw, which, being turned round, presses the upper die down upon the blank piece of coin which is laid upon the lower die and gives the impression, a sufficient force being obtained from the momentum of the loaded arms RR. The motion is communicated to the screw by a piece A, which ascends to the ceiling of the coining-room, and is worked by a steam-engine, with machinery, in the apartment in the room over the coining room.

Eight presses, similar to No. 1., are placed in a row upon the stone basement, and very strong oak pillars are erected upon the basement, and reach to the ceiling. Each press is contained between four such pillars, and iron braces are fixed horizontally from one pillar to another on the opposite side. These braces support blocks of wood against which the ends RR of the arms strike, to stop them from moving farther than necessary, as, without such precaution, the hard steel dies would sometimes come in contact and be broken. The piece of blank coin is contained within a steel ring or collar, whilst it is stamped, and this preserves its circular figure. The ring is shown at a large size at W, in fig. 5. V is a three-pronged spring which always bears the spring upwards; the opening through the ring W is made to fit upon the neck of the lower die T, fig. 6. When the ring is dropped upon the neck of the die, the upper surface of the ring and of the die will be in one plane. The ring admits of being raised up upon the neck, and will then form a recess or cell, which is just adapted to receive a piece of money. The collar W is made to rise and fall upon the neck of the die by means of the levers GG, fig. 5.; these are fitted upon centre pins or joints in a large ring *gg*, which is placed on the outside of the box, fig. 6., containing the lower die T, and is fixed fast upon it, as shown at 5 and 6, fig. 1., by clamping the screws *gg*. The levers GG are forked at the outer ends to admit studs at the lower ends of iron rods EE, which rise up through holes in the solid metal of the press, and are united to a collar G, fitted on the upper part of the screw D. When the screw of the press is turned back, and the upper die is raised up, the rods raise the outside ends of the short levers G, and the inside ends depress the ring; a blank piece of money is laid upon the die, and when the screw is turned to bring the upper die down upon it, ready to stamp the impression, the levers G are released, and the triple spring V lifts the collar up, so that it surrounds the piece of money; and in this state the blow is struck. Immediately after the press returns by its recoil, and then the levers G force the collar down upon the neck of the die, and leave the piece free. The lower die is fixed in a box, fig. 6., by four screws *tt*, which admit of adjusting it with precision beneath the upper die. The box, fig. 6., is screwed down upon the base of the press by four screws. The upper die is shown at S, fig. 3., which explains how it is fastened to the screw; *vv* are four screws, by which the die is held in a box, fig. 3. The box is fitted into a ring or collar, as shown by the dotted lines, F: see also fig. 1. The arms of the collar F are attached to the rods EE, by two nuts at each end, and this makes the collar F and the box 3. always follow the screw, and keep a close contact with the end of the screw, which enters into a cell in the top of the box, fig. 3., but leaves the screw at liberty to turn round independently of the box.

Fig. 2. is a ring which is fastened by its screws, *ww* to the screw of the press; a claw V, descends from the ring, and enters into cavity *o*, in the edge of the box, fig. 3., which cavity is near three times as wide as the claw V, and therefore allows the screw to turn round for a certain distance without turning the box, fig. 3., but beyond the limits of this motion the screw and die will turn round together. The intention of this is to press the upper die down upon the coin with a twisting or screwing motion; but if the die was to rise up with a similar motion, it would abrade and destroy the fine impression; for this reason the notch *o*, is so wide as to allow the screw to return, and raise the die from immediate contact with the coin, before it shall begin to turn round with the same motion as the screw.

Fig. 4. is a box which is screwed over the box for the upper die, as shown in fig. 1., in order to keep the upper die firm in its cell.

The great screw of the press is made cylindrical at the upper and lower ends, where it is seen at DD, fig. 1., and these ends are accurately fitted in collars, which are bound tight by the screws *aa*; the real screw or worm, part concealed within the solid metal B, and has no other office than to force the die down, the guidance laterally being effected by the collars *aa*.

It now remains to show how the press is made to remove every piece of money which it strikes, and to feed itself with a fresh blank piece.

Fig. 1. HIK, is a lever, of which I is the fulcrum; it is supported on a bar Q, fixed vertically from the cheek of the press, and steadied by a brace *h*. The upper end of the lever is actuated by a sector 7, see fig. 7., which is fixed upon the screw D. When the screw turns round, the groove in the sector being of a spiral curve, will move the end H of the lever to and from the screw; and the lower end K of the lever being longer, it moves a considerable distance to and from the centre of the press. *b* Is a socket or groove in a piece of metal, which is fixed to the perpendicular bar Q, and the upper end of the lever H is guided in this groove, to prevent any lateral deviation.

The lever K gives motion to a slider L, fig. 8., which is supported in a socket O, screwed against the inside cheek of the press, and the slider 8 is directed exactly to the centre of the press, and on the level of the upper surface of the die.

Figs. 8. 9. and 10. represent three views of the slider and socket; NMO is a kind of trough or socket in which the slider runs; this slider is formed of two pieces hollowed out on the sides, which are put together, and the two pieces are held together by screws. O is the part by which the socket is fastened to the press. The slider is a thin steel plate *p*, see also fig. 10.; it is made in two pieces, P and *p*, which are united by the joint *q*. The extreme end is made with a circular cavity; and, when the two limbs shut together as represented, they will grasp a piece of money between them, and hold it by the edge; but, if the limbs are separated, the piece will drop out. The limb *p* of the slider is opened or shut by the same movement which moves the slider endways in its socket. Thus a plate L is applied flat beneath the socket MN, and has an edge turning up and applying to the upright edge of the socket. A pin is fixed into this edge, and is embraced by the fork at the lower end of the lever *k*, fig. 1. By this means the sliding piece L is made to move on the outside of the socket N. It is kept in its place by a fillet *k*, fig. 9., which is screwed to the upright edge of L, and the fillet enters a groove formed along the upper surface of the socket N.

The sliding piece L is made to move the steel slider within the socket by means of three studs, which project upwards from the bottom plate of L, fig. 10., at *rrs*, and pass through grooves in the bottom plate of the slider, so as to act upon the steel slider P, in the manner shown fig. 10. The left hand piece *r* is received into an opening in the middle of the slider P, fig. 10. The other two studs *r* and *s* include the shank of the limb *p* between them, and these studs are cut inclined, so that, when the piece L is moved to the right, the studs *rs* will close the limb *p* until they are shut, and then the studs will carry the slider forward; but, if the sliding piece L is moved to the left, its studs will first close the limbs, and will then draw back the slider. On the top of the socket N a tube M is placed, and it is filled with blank pieces of coin; the tube is open at the bottom to the slider, and the pieces rest upon it. When the screw of the press is screwed down, the slider P draws back to its farthest extent, and the circle formed at the end between its limbs comes exactly beneath the tube M; the limbs being open, a blank piece of coin drops down into the circle of the slider, then the screw of the press, in returning, moves the lever HIK and the piece L; this acts by its studs upon the moveable limb *p*, and closes it upon the blank piece; the studs having now found a reaction, push the slider P forwards in its socket, and carry the piece forward upon the die, as shown in fig. 1., and which will push off the piece last struck. The screw having now arrived at its highest position, begins to descend, and the slider L to return; but the first action of the studs of the sliding piece L is to open the limb *p*, and then the slider withdraws, leaving the piece of money placed upon the die. As the screw of the press descends, the ring W, fig. 5., rises up to enclose the piece as before mentioned, whilst it receives the stroke, and the slider P at the same time returns to take another piece from the tube M in the same manner as before described.

Fig. 11. is a section to show the manner of mounting the lower die for a coining press. This is used in the French mint. V is a piece of metal or box, as it is placed upon the base of the press, and held down by a ring with screws *t*; this holds it fast, but admits of lateral adjustment. In the top of the box is a hemispherical cavity to receive the hemisphere W; the upper side is flat, and the die T is placed upon it, to hold the die down; it has a small projecting rim at the lower edge, and a rim X is screwed upon the outer edge of the box V, and binds the die down. The object of this plan is, that the die may always bear fairly to the money which is to strike.

Figs. 12. and 13. is a divided collar invented by Mr Drez, for striking money with the letters round the edge. X is a very strong piece of iron, which has a circular opening through the centre; into this, six segments *ww* are fitted, and between them they leave an opening W, the size of the piece of money; the interior edges of these segments are engraved with the pattern or device which it is required to impress upon the edge of the piece. The segments are fitted in the piece X by centre pins *y*, fig. 12., upon one of which pins each segment can rise in the manner of a centre.

The intention of this is to have a piece of money placed on the die within the space W; then, when the pressure is made upon the piece, the die descends some space, and by this motion the segments close together around the edge piece, and imprint upon the edge of it. When all the segments come into one plane, the die arrives at a firm seat, and the metal receives the stroke which make the impression on its surfaces. The die is suspended in a sort of cup, which rises and falls with the screw, nearly the same as the collar F in fig. 1.

Disposal of the Coined Pieces.

The coining room is under the superintendence of the surveyor of the money presses, whose duties we have already described. The money, when struck, is inspected under his directions, and passed through tubes of diameter, of the different species, which readily detects any pieces which may have been improperly struck. The moneyers cannot coin, but in his presence, as he has every press under lock and key.

The money when examined is weighed up in journey weights for delivery to the importers of the bullion. The gold in 15 lbs.; the silver in 60 lbs. Troy.

Process of Pixing.

Before this money, however, is delivered to the importers, it is carried to the mint office, to undergo inspection, and to be pixed. The inspector examines the coin as to its workmanship, and may reject it if faulty. The process of pixing is more important, as by it the perfection of the money, as to weight and fineness, is determined before it is delivered to the importers. The process of pixing, as it is called, consists in taking from every journey weight of gold and silver, a pound in tale promiscuously, by the weigher and teller. This is weighed in a very accurate balance by the King's assayer master, who declares aloud the minus or plus upon each lb., and which is recorded by the comptroller, King's clerk, and King's assay master. This determines whether the company of moneyers have made the money within the remedy allowed upon the pound Troy. As the remedy, however, upon the pound Troy is divided among the number of pieces in it, the same pound weighed is handed to the comptroller, who, in a delicate balance, weighs several pieces individually; and, if they exceeded the remedy, he could, in conjunction with the other check officers, order the coin to be remelted and recoined at the expence of the moneyers. From the same pound weight of silver or gold, the comptroller takes two pieces; the one for the King's assayer master to assay, in order to prove that the company of moneyers have in no way or degree deteriorated the quality of silver or gold in any of their processes, or from the time of its having come into their possession. The other piece is ensealed in a packet, and put into a box (called the pix-box), which is locked up under the separate keys of the said officers, there to remain until the final trial of the pix by jury, before the King, or such of his Council as are usually appointed at Westminster or elsewhere, for that purpose. When the King's assay master has proved the piece delivered to him to be of the right standard (and which, in this case, is taken as the average of the whole journey weight), he authorizes the money to be delivered to the importers of the bullion. During the period, however, in which the assay is making, the money is deposited in the strong-room of the mint treasury, under the separate keys of the master, comptroller, and company of moneyers. The money is delivered over to the importers by the weigher and teller, and in the presence of the master, comptroller, King's clerk, and one of the moneyers; the master receiving a receipt for the same, as described in the duties of the deputy-master and workers.

As the trial of the pix at Westminster is very ancient and curious, and though done in an open court, is yet so little known, it may not be uninteresting to trace it from the earliest period in which it is to be found in our records,—to state the changes which it has undergone, and the manner in which it is conducted in the present times.

The Rev. R. Rudding, to whom we acknowledge ourselves much indebted for much valuable information in the preceding pages, gives the following account of the trial of the pix.

"It does not appear that the ancients had any such public trial; and the earliest notice of the pix, which I have met with in any modern foreign mint, is in the reign of Philip VI. of France, in the fourteenth century; but whether the passage in which it occurs relates to a public trial, cannot be determined.

"The invention of it in this kingdom, or at least its introduction into our courts, is probably of high antiquity, for in the 9th or 10th of Edward I. it is mentioned as a mode well known, and of common usage. In one of those years the King, by his writ, commanded the Barons of the Exchequer to take with them Gregory de Rokesle (then master of the mint), and straightway, before they retired from the exchequer, to open the boxes of the assay of London and Canterbury, and to make the assay, *in such manner as the King's Council were wont to do*, and to take an account thereof, so that they might be able to certify the King touching the same, whenever he should please.

"From this record, which is the most ancient hitherto discovered relating to this trial, it appears that, previous to the above date, it had usually been made before the King's Council, but that, by the authority of the writ above quoted, it was then to be held in the Court of Exchequer, in the presence of the Barons. It was afterwards taken from their cognizance, and came again under the power of the Lords of the Council in the Star Chamber, where it is found to have been in the year 1595 (as appears from a verdict of that date), and where it continued until 1699, when it again became subject to the Court of Exchequer; under which it has remained to the present time.

"From memoranda of assays, which are still preserved in that court, it seems that this trial used to be annually; and the same is stated to have been the regular practice until the usurpation, when it was held at such times as the state pleased. At present, I believe it is not customary for the master to require it to be held until, upon his removal from the office, it becomes necessary, in order that he may receive his quietus.

"As the authoriry under which these trials are held occasionally varied, so did likewise the persons who sat as judges in the court. Thus, as we have seen above, they were first the members of the King's Council, then the Barons of the Exchequer, and again the members of the Privy Council, as judges of the Star Chamber, where sometimes the King himself presided; as did James I. at an assay, which was made upon the 9th May 1611.

"In 1643, a committee of Lords and Commons was appointed by order of Parliament, for the purpose of making this trial.

"At one period (in 1649), the court was held before the Lord President of the Council of State, the Commissioners of the Great Seal, and others of the Council of State, and Committee of Revenue, by virtue of an act of Parliament: at another (in 1657) by the Lords Commissioners of the Great Seal, assisted by the Lords Commissioners of the Treasury, the Justices of the several Benches, and Barons of the Exchequer, or some of them, under the authority of a warrant signed by the Protector Cromwell; and it is now composed of such members of the Privy Council, as are expressly summoned for that purpose; the Lord High Chancellor, or, in his absence, the Chancellor of the Exchequer, presiding.

"The manner in which this trial was formerly conducted in the Court of Exchequer appears, from a verdict of the 11th year of Henry VI. to have been by an assay, made in the presence of the court, and of other persons who were appointed to assist, by the King's assay master, and to have been determined without the intervention of a jury.

"The earliest notice which has occurred, in which the judgment of professional artists was required to sanction, as a jury, the judgment of the court, is dated in the 37th of Elizabeth; when a trial was held in the Star Chamber.

"The number of the jurors has occasionally varied considerably. No less than nineteen names appear to the verdict of the 37th of Elizabeth; and in 1651 the moneyers speak of a jury of twenty-four men, whilst the number usual at the present time is no more than twelve.

"As I have not been able to discover any ancient ceremonial, by which the forms of this trial were regulated; I must now proceed to state the modern practice of summoning the court, and conducting the business of it.

"Upon a memorial, being presented by the Master of the Mint, praying for a trial of the pix, the Chancellor of the Exchequer moves his Majesty, in Council, to that purpose. A summons is then issued to certain members of the Privy Council, to meet at the house, which is now allotted to the office of Receiver of the Fees in his Majesty's Exchequer, at eleven o'clock in the forenoon, on a certain day. A precept is likewise directed, by the Lord High Chancellor, to the Wardens of the Goldsmiths' Company, requiring them to nominate, and set down, the names of a competent number of sufficient and able freemen of their company, skilful to judge of, and to present the defaults of the coins, if any should be found, to be of the jury, to attend at the same time and place. This number is usually twenty-five, of which the assay master of the company is always one.

"When the court is formed, the clerk of the Goldsmiths' Company returns the precept, together with the list of names; the jury is called over, and twelve persons are sworn. The president then gives his charge, which was formerly to be general, like the oath, to examine by fire, by water, by touch, or by weight, or by all, or by some of them, in the most just manner, whether the monies were made according to the indenture, and standard trial pieces, and within the remedies. But, in 1754, the Lord High Chancellor Talbot directed the jury to express precisely how much the money was within the remedies, and the practice which he thus enjoined is still continued. The other parts of the charge necessarily vary, according to the ability of the president, and his knowledge of the subject.

"When it is concluded, the pix is delivered to the jury, and the court is commonly adjourned to the house of the president, where the verdict is afterwards delivered.

"The jury then retire to the court-room of the duchy of Lancaster, whither the pix is removed, together with the weights of the exchequer and mint, and where the scales which are used upon this occasion are suspended, the beam of which is so delicate, that it will turn with six grains, when loaded with the whole of those weights, to the amount of 48 lb. 8 oz. in each scale.

"The jury being seated, the indenture, or the warrant under which the master has acted, is read. Then the pix is opened, and the money which had been taken out of each delivery, and enclosed in a paper parcel, under the seals of the warden, master, and comptroller of the mint, is given into the hands of the foreman, who reads aloud the indorsement, and compares it with the account which lies before him. He then delivers the parcel to one of the jury, who opens it, and examines whether the contents agree with the indorsement.

"When all the parcels have been opened, and found to be right, the monies contained in them are mixed together in wooden bowls, and afterwards weighed.

"Out of the said monies so mingled, the jury take a certain number of each species of coin, to the amount of one pound weight, for the assay by fire; and the indented trial pieces of gold and silver, of the dates specified in the indenture, being produced by the proper officer, a sufficient quantity is cut from either of them, for the purpose of comparing with it the pound weight of gold or silver which is to be tried (after it has been previously melted and prepared) by the usual methods of assay.

"When that operation is finished, the jury return their verdict, wherein they state the manner in which the coins they have examined have been found to vary from the weight and fineness required by the indenture, and whether, and how much, the variations exceed, or fall short of, the remedies which are allowed; and, according to the terms of the verdict, the master's quietus is either granted or withheld."—*Archæologia*, Vol. XVI.

Method of Making the Dies.

We shall conclude our observations upon the subject of coinage, by detailing the mode of manufacturing the dies. An original die is engraven upon a piece of soft cast steel, of the size of the money to be made. The table of the die must be perfectly level or square. The impression engraved is, of course, cut into the steel, and its depth in proportion to the relief ultimately wanted upon the coin. When the engraving is finished, the die, or matrix, as it is called, is hardened. This is a very nice process, and requires considerable care to perform it. The die is put into a cast iron pot, completely embedded in animal charcoal, chiefly made from leather. The pot is placed in an air furnace in which coke is burned, which gives a more steady and uniform degree of heat. The square of the furnace is also considerably larger than the pot, that the die may have the greatest possible equality of temperature. When the die has attained its proper degree of heat, it is withdrawn from the furnace, and immersed in a large cistern of water, the temperature of which is kept as uniform as possible by a stream of cold water constantly flowing in and out of the cistern, while the process of hardening continues. It frequently happens, that in this process (either from the steel being faulty or heated to excess) the die will fly in pieces, and the whole labour of the artist is lost. When, however, the matrix is perfect, it is placed in the multiplying die press, which works in every respect like a coining press, but moved by men. An impression is taken from the matrix upon a blank die of cast steel, similar to the mode of impressing the money. The blank die is fixed as the lower die of the coining press; and, by working the screw of the press, which has very long and heavily loaded arms, the matrix is made to strike the blank die with great force, and bring its impression in *relief* upon its surface. The hardness, by compression of the steel, is so great, that an impression of the matrix cannot be obtained without annealing the die perhaps twice or three times, which is done in iron pots, as in the case of hardening, but are allowed to cool gradually. An impression taken in this way is called a puncheon die. When the engraver has given all the delicate outlines of the original to it, it is hardened in the same manner as its original, and used to give impressions to blank dies by a similar process, the impression being *sunk* into the dies, which dies being used for coinage, gives the impression in *relief* to the money.

This important department of the mint is under the superintendence of the clerk of the irons, who never suffers the multiplying press to be used but in his presence. He has also the care of all the dies, and must account to the Board of Management for all matrixes, puncheons, and dies, made and destroyed in the mint.

(A. A.)

COLD.

Cold is only Relative.

It is often disputed whether Cold has any actual existence, or should be considered as merely the privation of Heat. Nor is that question of a modern date; Plutarch attempted to discuss it, in his Tract *De primo frigido*, and the reasonings which he there employs, though abundantly vague, are yet curious. Cold, he says, affects the senses as well as heat; and it is not less active, since it condenses and consolidates bodies. He, therefore, inclines to the opinion, that cold is a distinct and independent power in nature. With the Stoic philosophers, he regards air as by its constitution cold and dark; and hence water drawn from a well freezes on being exposed to the atmosphere, while rivers overshadowed by high banks seldom freeze, and even where their surface congeals, the heat is not exhaled, but only driven down nearer the bottom.

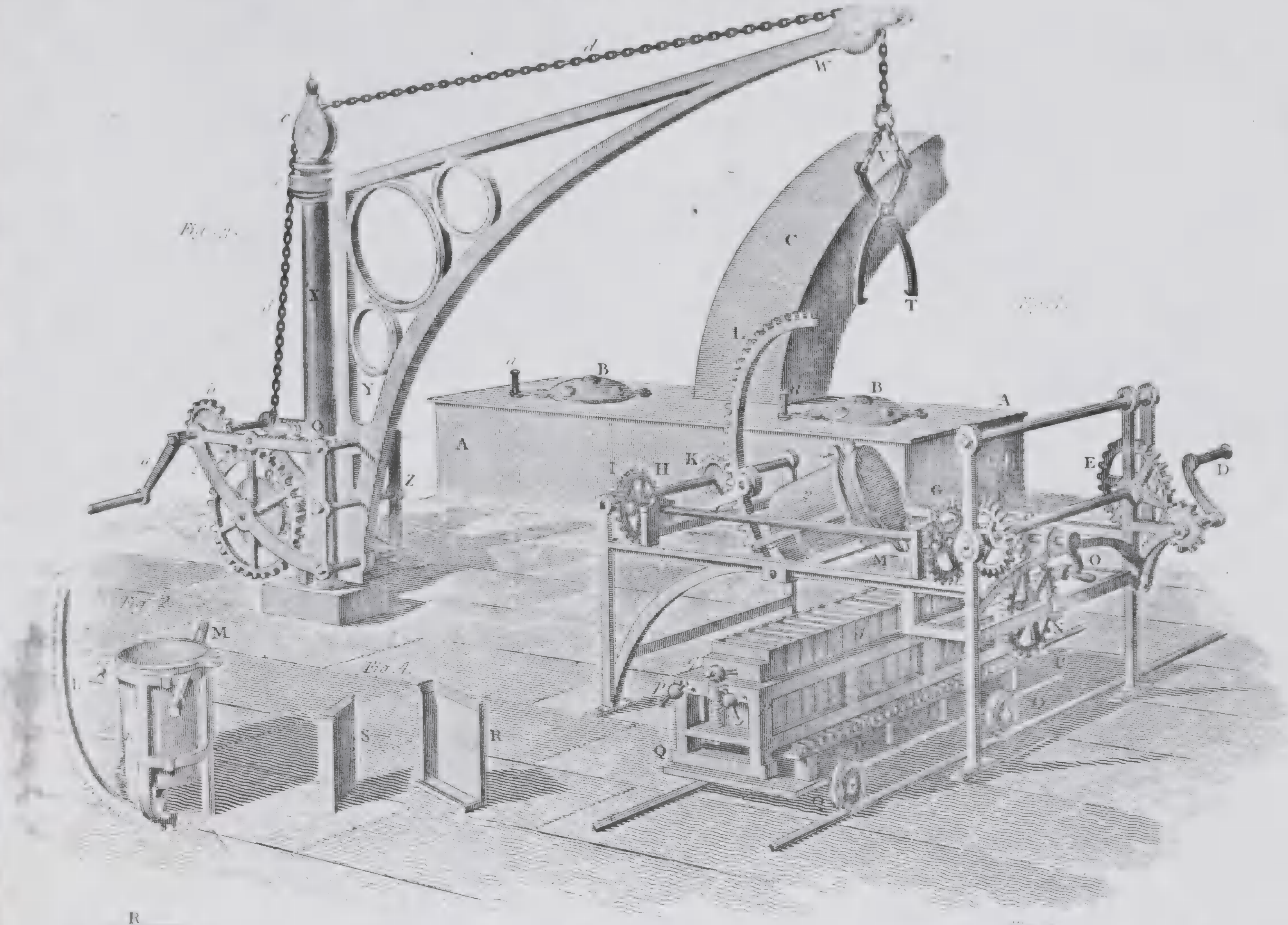
The Diminution of Heat.

It is contrary to sound physics to admit more principles than are indispensably required, and this argument alone may be sufficient for the rejection of cold as a distinct power in nature. What we term cold, in reference to our feelings, is merely the diminution of heat. But the existence and materiality of heat rest on a very different foundation. The introduction of heat into a body is accompanied by the infusion of a certain extrinsic repulsive force, and its passage through the mass is connected with a series of depending internal motions, which imply the regular expenditure of time and ve-

COINING.

PLATE LXI.

Machine for casting the Ingots of Silver, at the Mint.



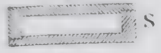
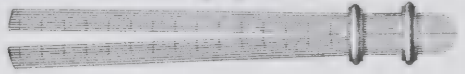
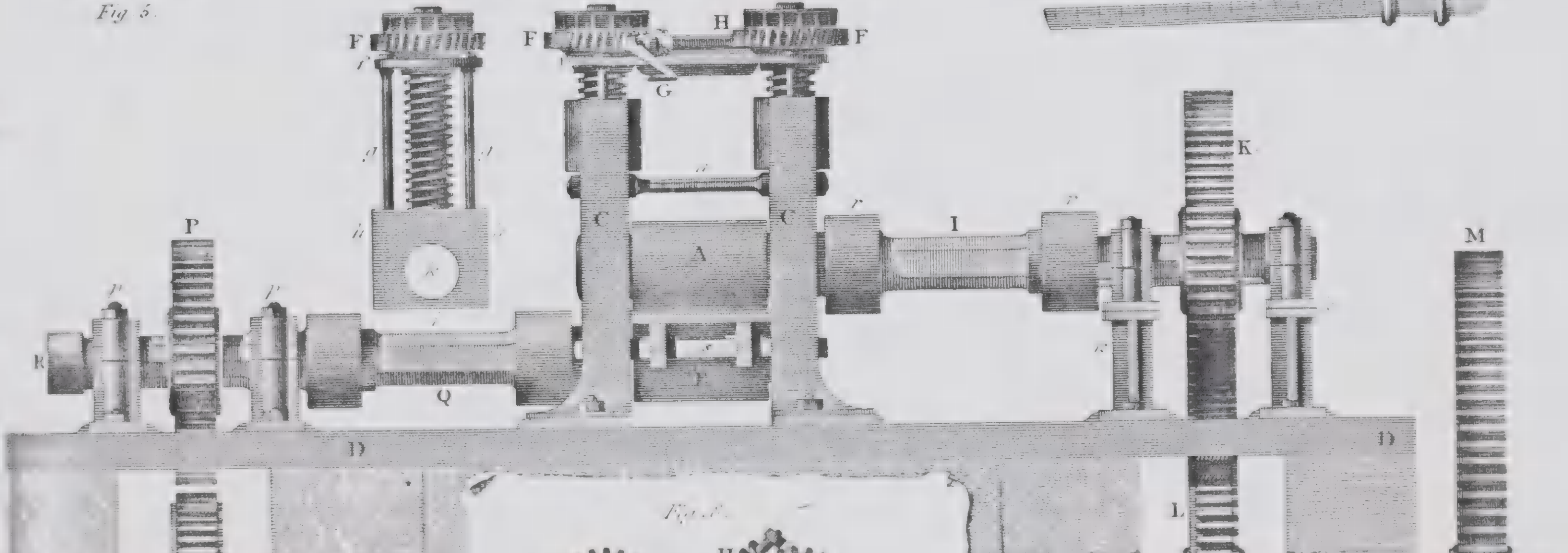


Fig. 5.

Laminating Rollers. Fig. 6.





J. Farey delin. E. Turrell sculp.

Published by A. Constable & Co. Edin^r. 1818.

COINING. PLATE LXII.

Machines used in the Mint.

Fig. 4.

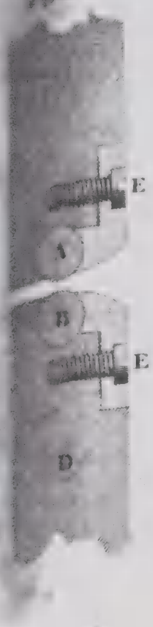


Fig. 1.

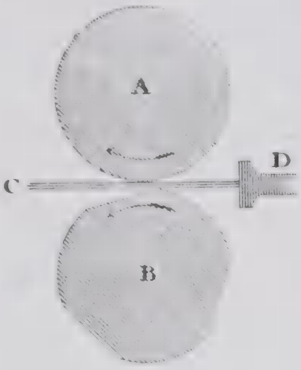


Fig. 2.

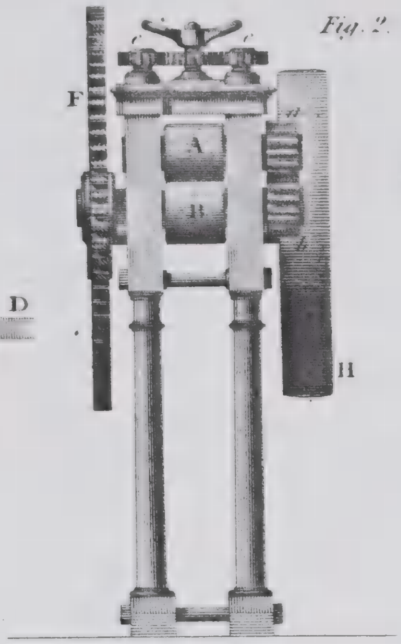
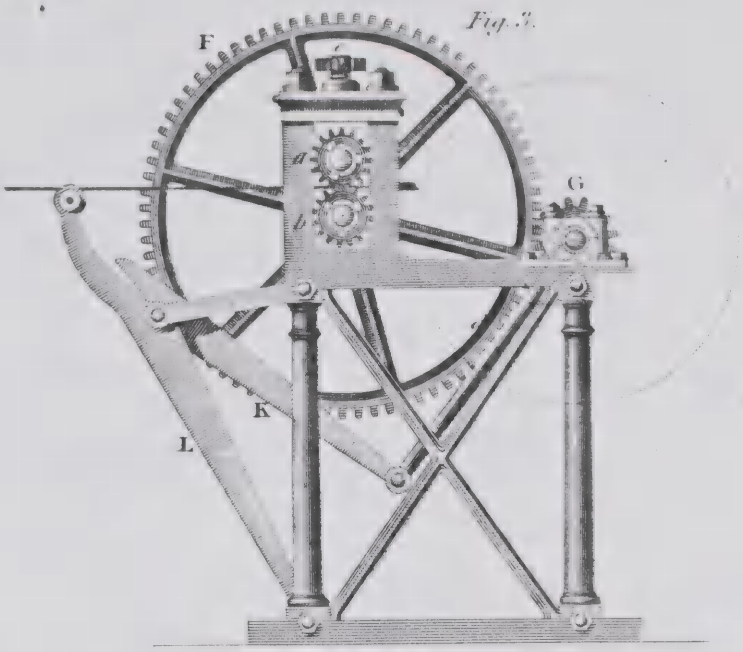
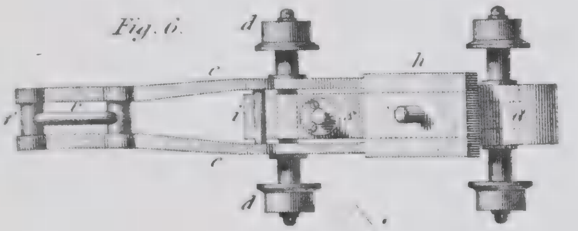


Fig. 3.



Mr. Barton's Machine for reducing Plates of Metal to an equal thickness.

Fig. 6.



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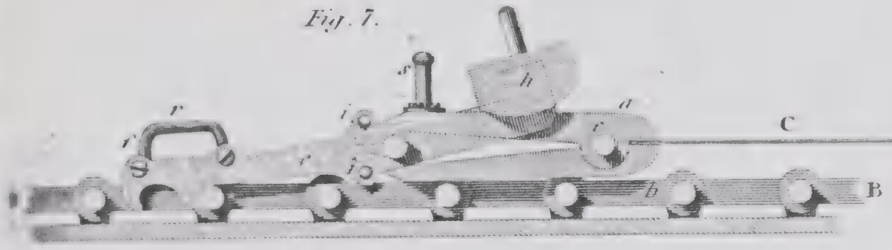

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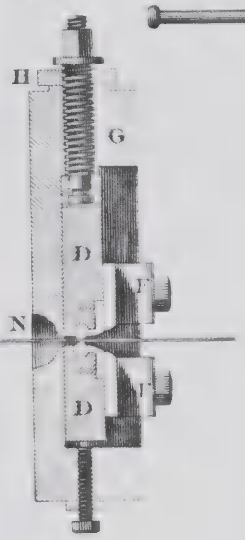

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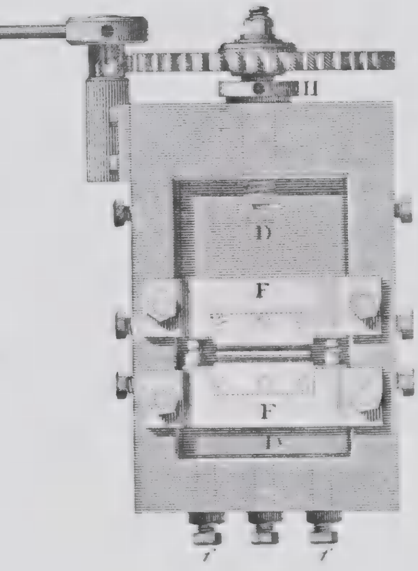
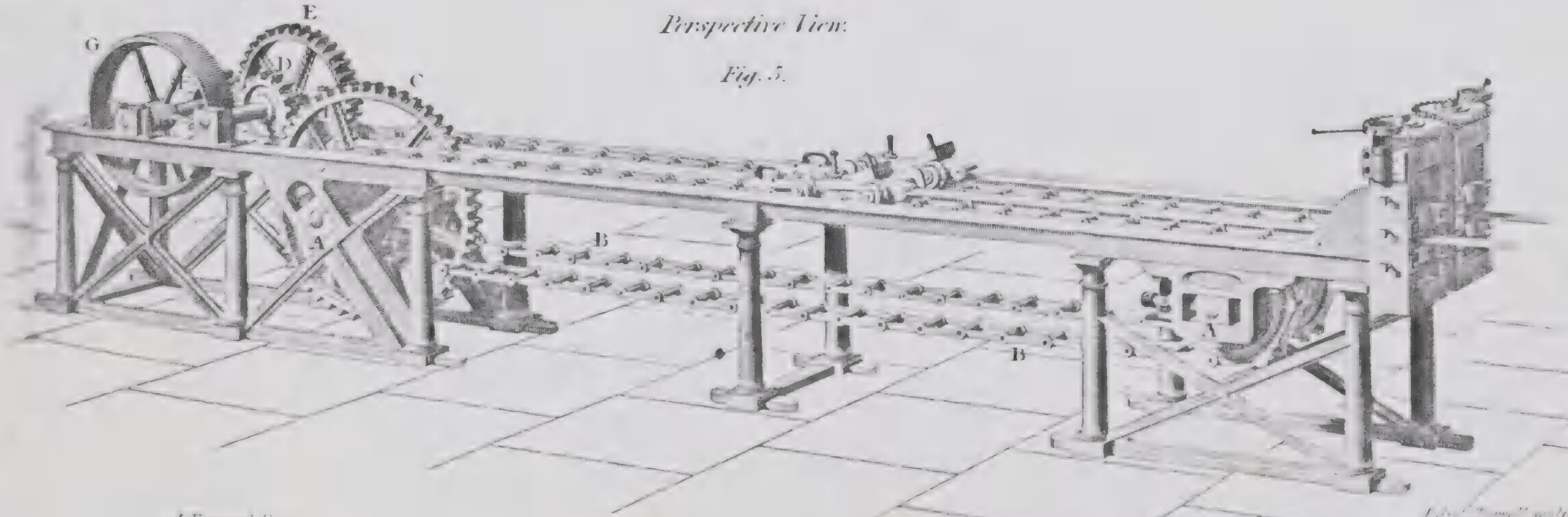


Perspective View.

Fig. 5.



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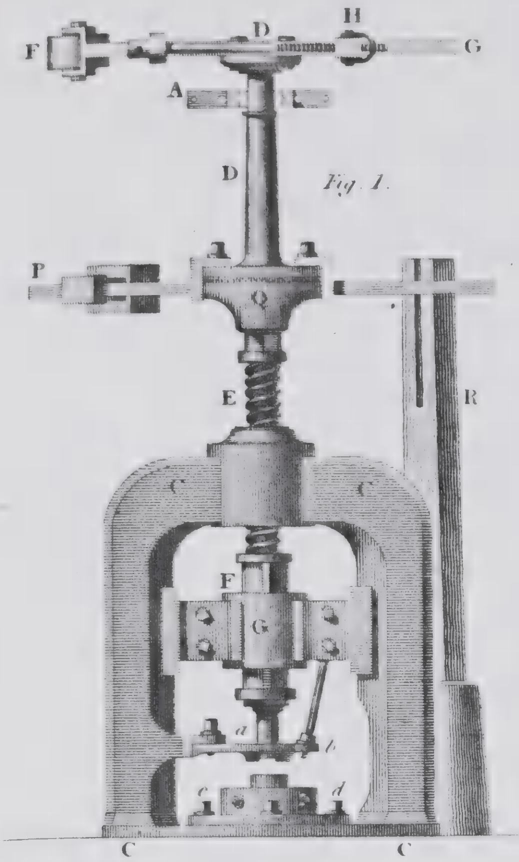
COINING.

PLATE LXIII.

MACHINES used in the MINT.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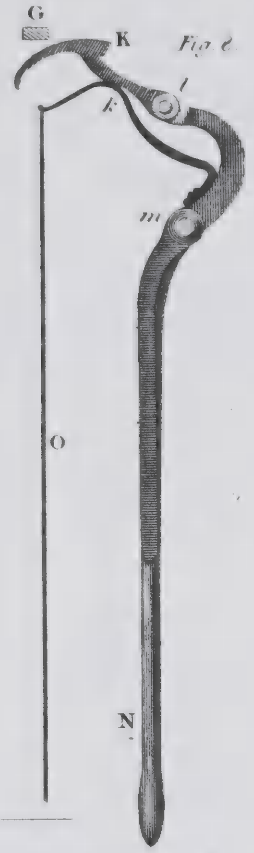
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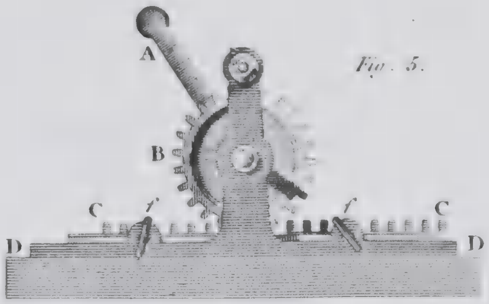
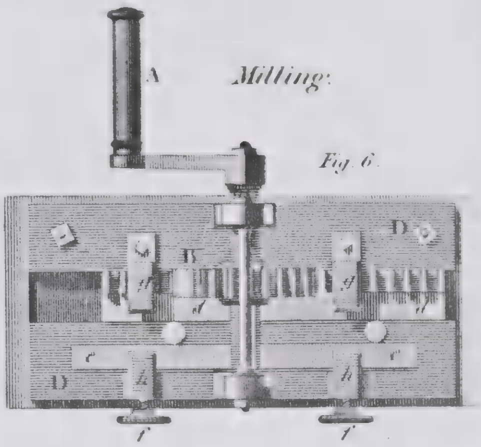


Fig. 5.

Milling.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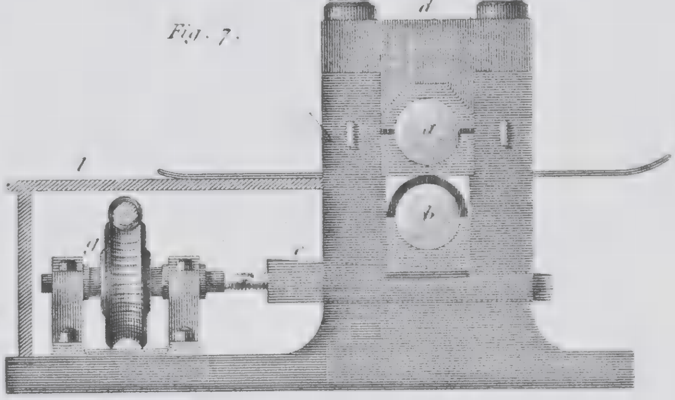
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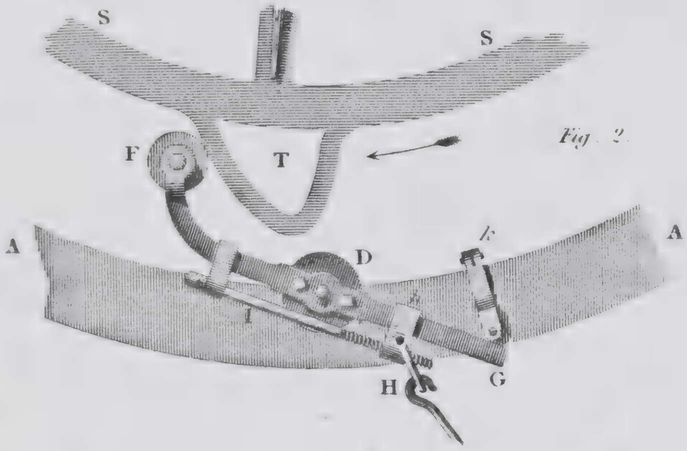
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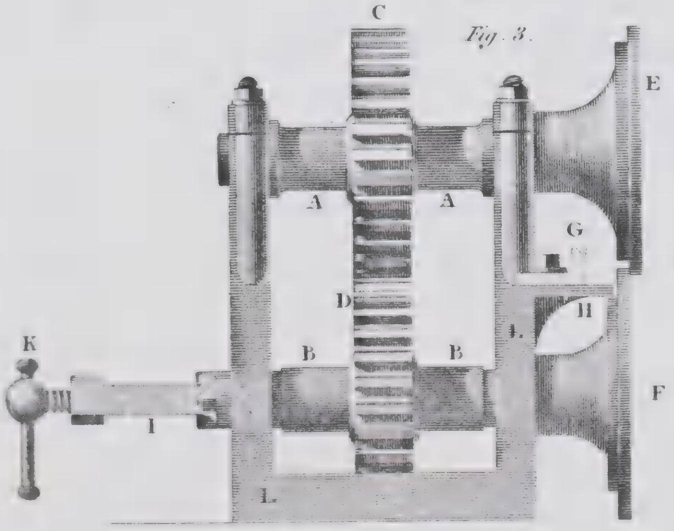
Fig. 3.

Circular Shears.

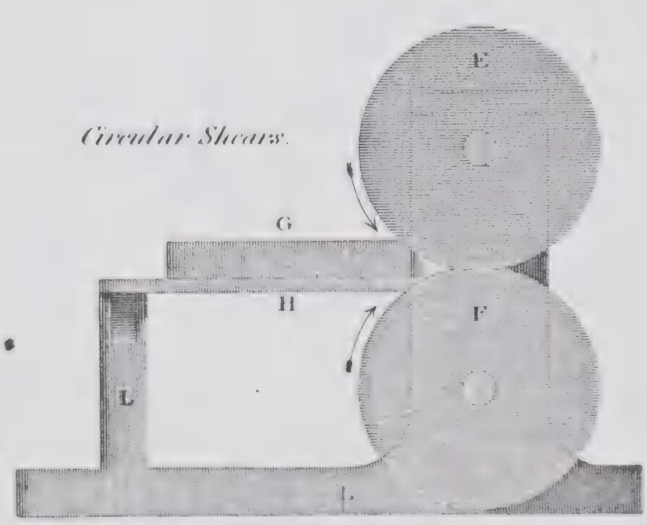
Fig. 4.

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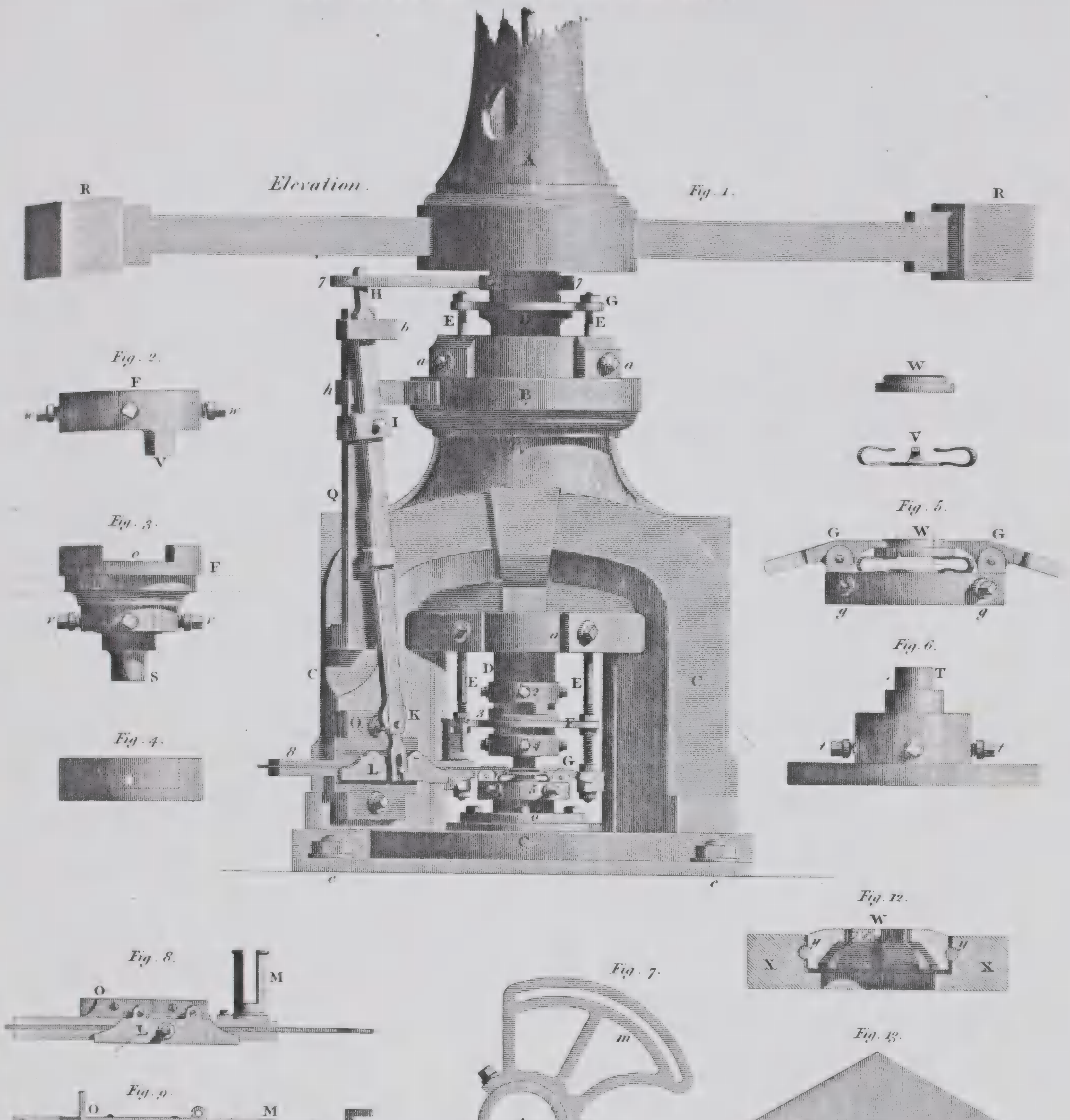
COINING.

PLATE LXIV.

COINING PRESS used in the ROYAL MINT.



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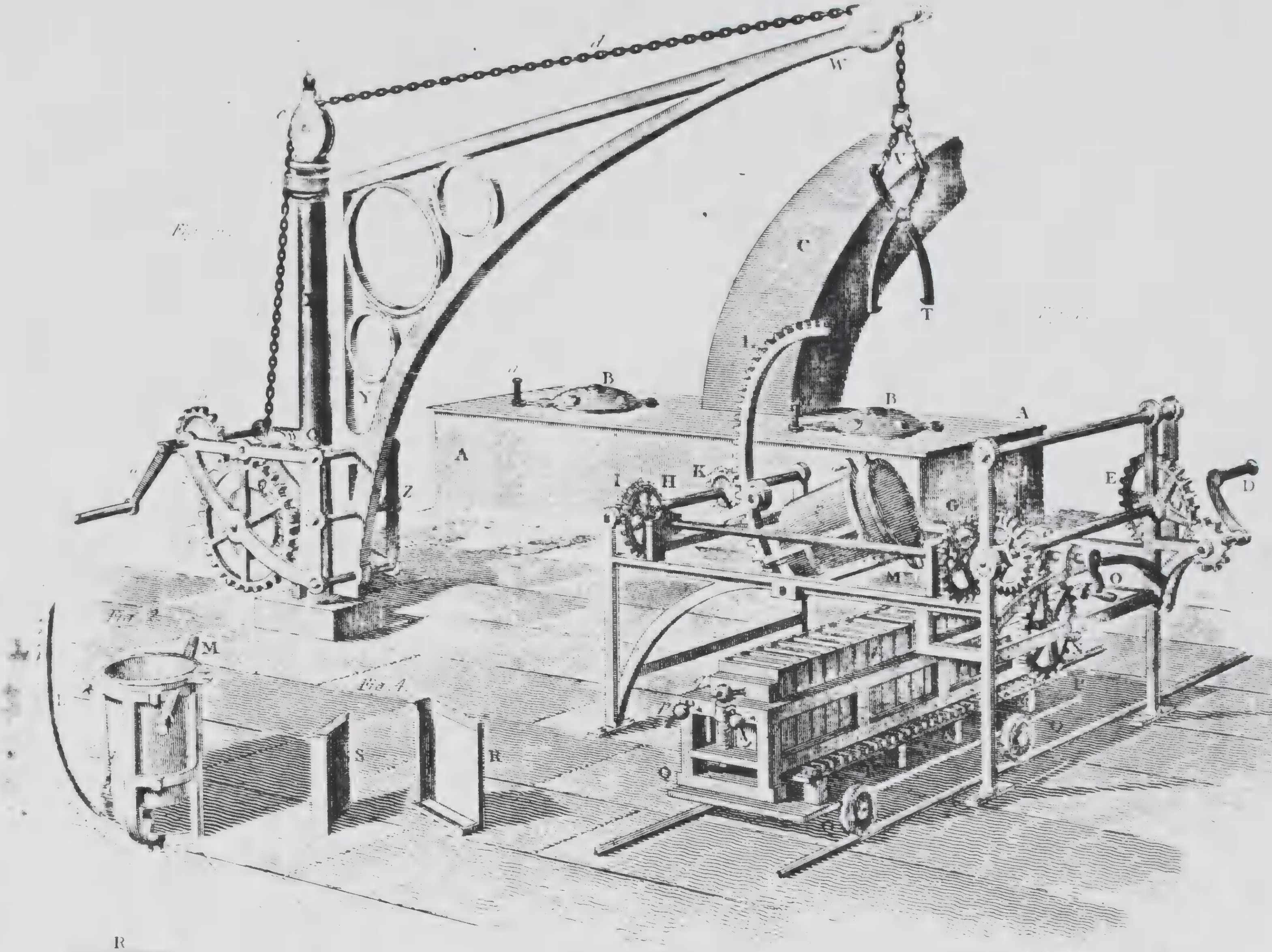
COINING. *PLATE LXI.*

Machine for casting the Ingots of Silver, at the Mint.



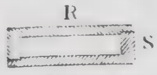
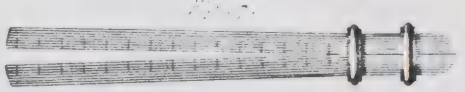
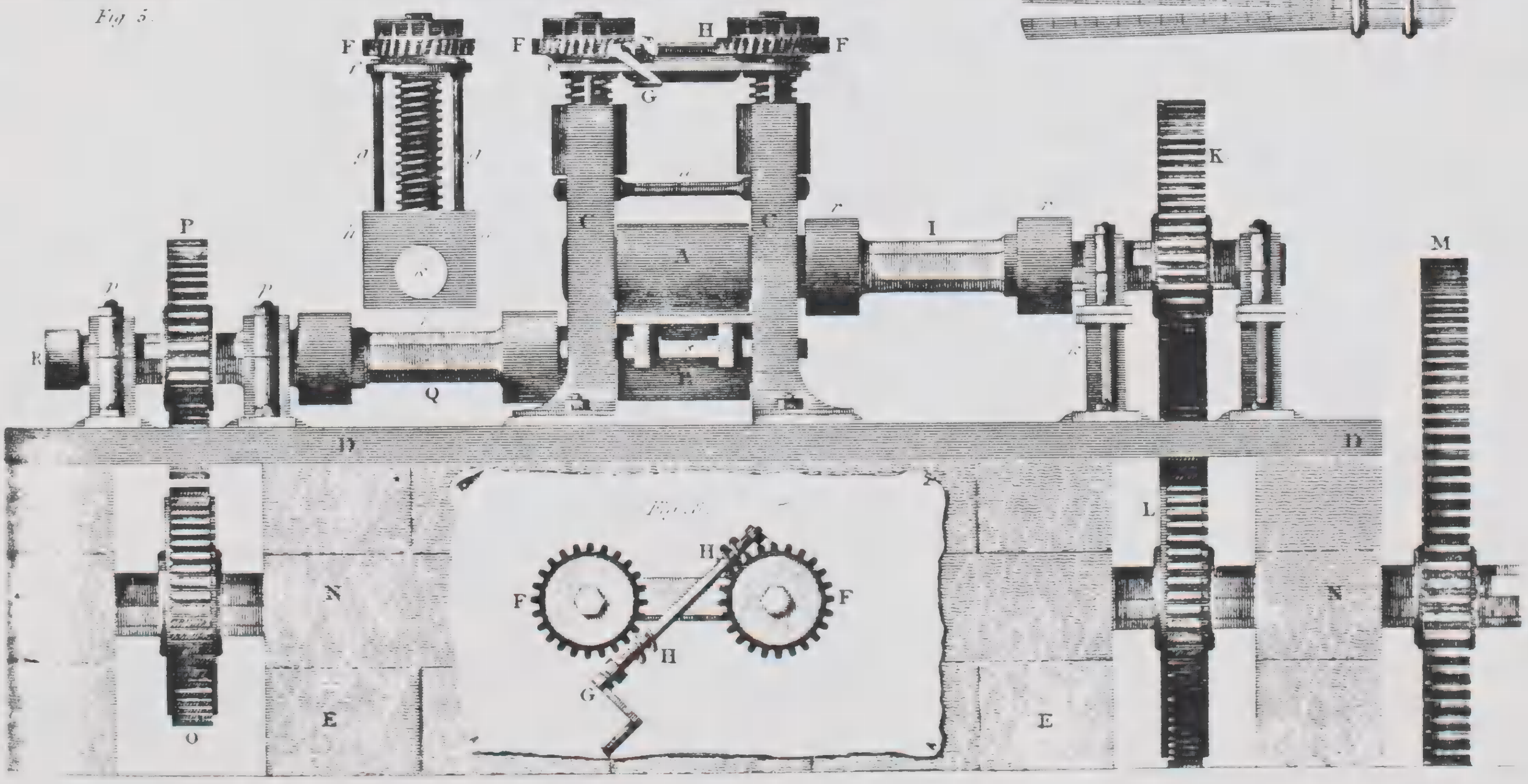


Fig. 5.

Laminating Rollers. Fig. 6.





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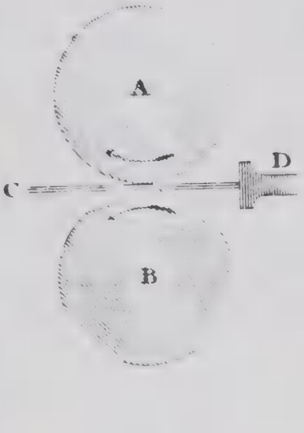
COINING.

PLATE LXII.

Machines used in the Mint.

Fig. 1.



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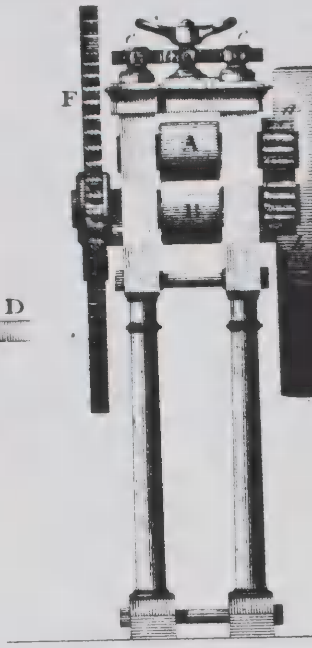
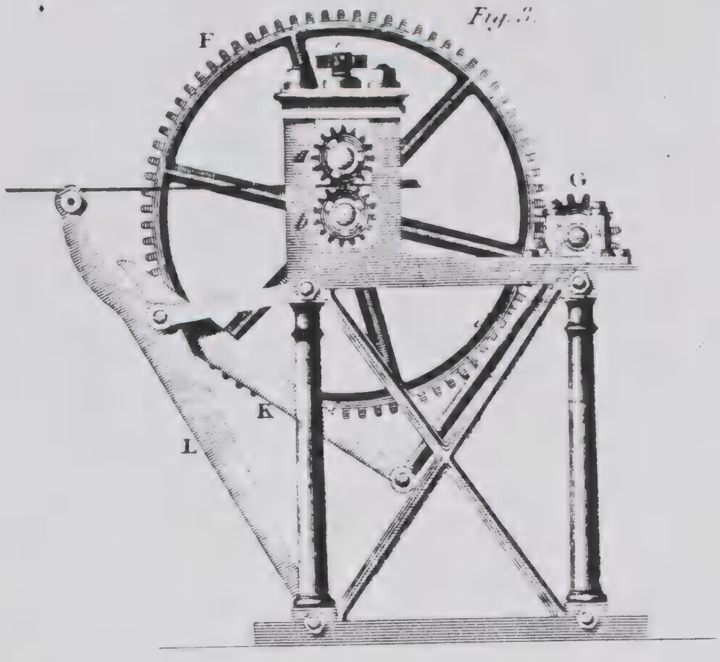


Fig. 3.



Mr. Barton's Machine for reducing Plates of Metal to an equal thickness.

Fig. 6.

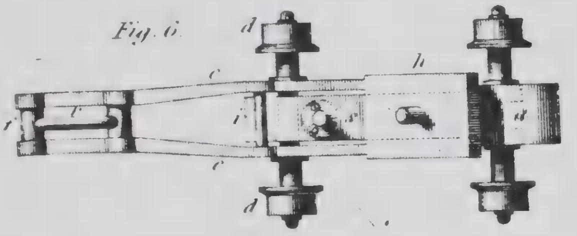


Fig. 7.

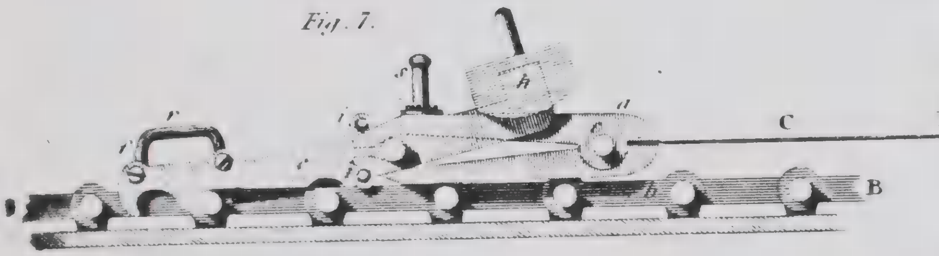
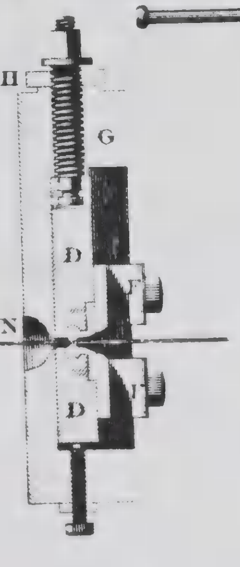


Fig. 8.



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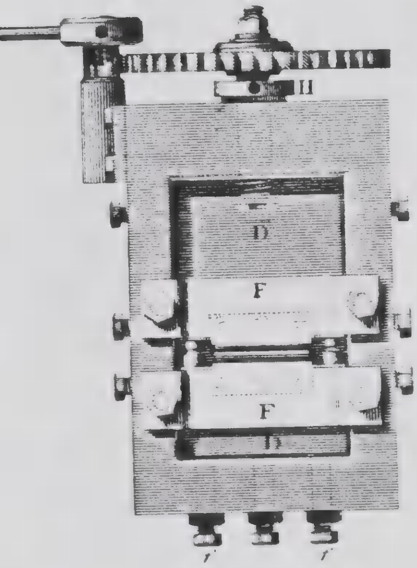
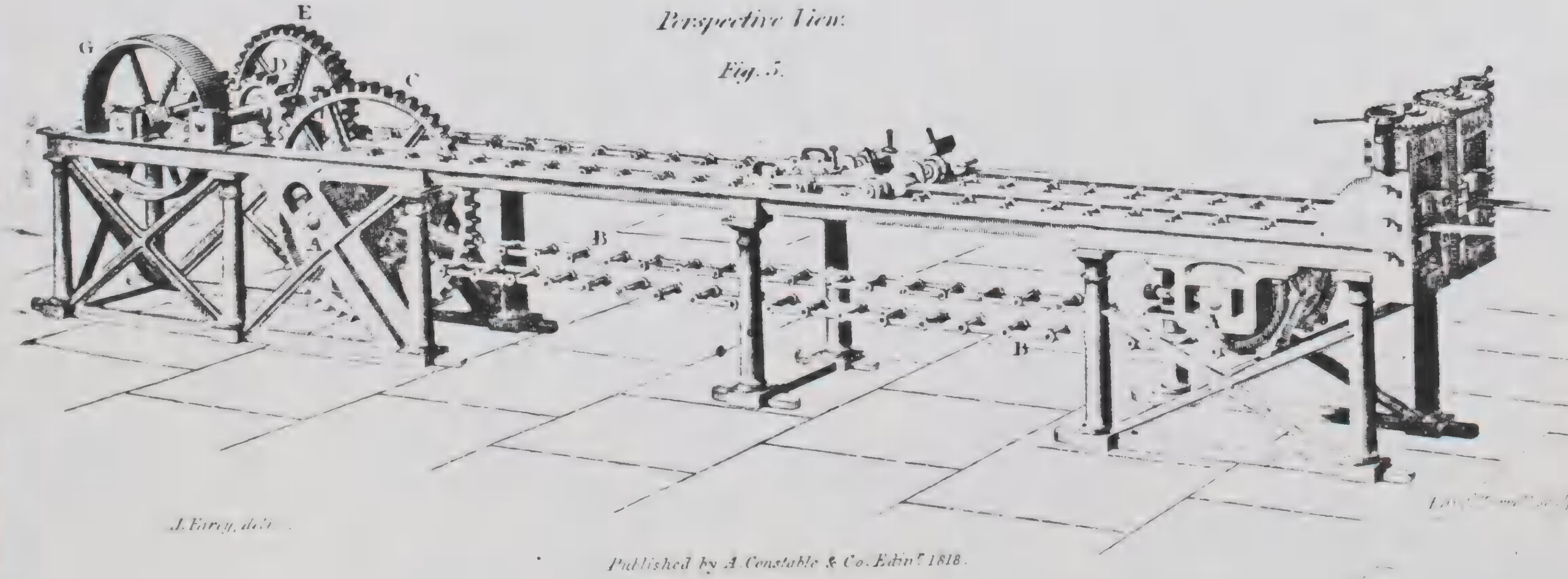


Perspective View.

Fig. 5.



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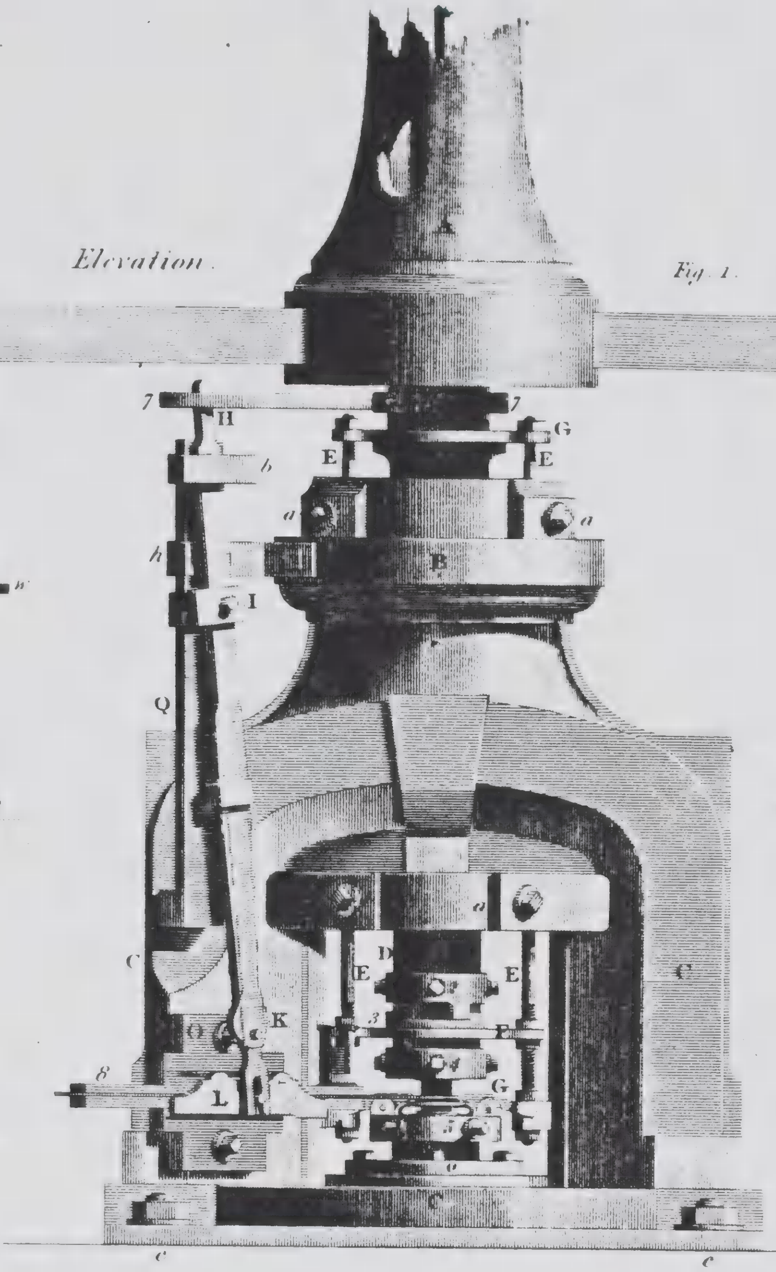
COINING PRESS used in the ROYAL MINT.

Elevation. Fig. 1.



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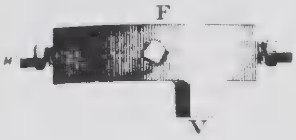

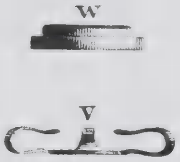

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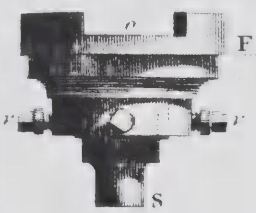

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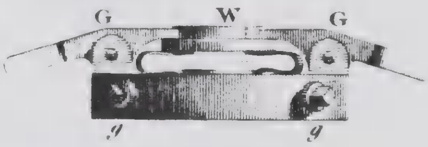

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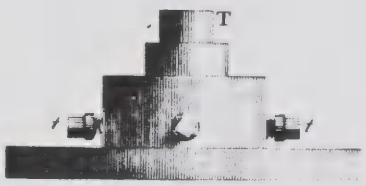

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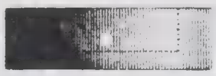

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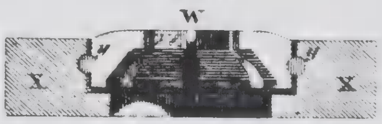

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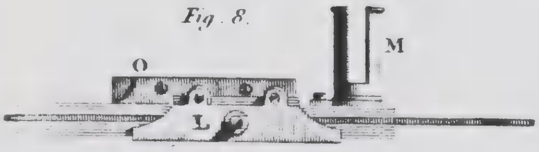

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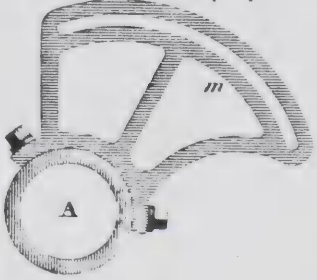

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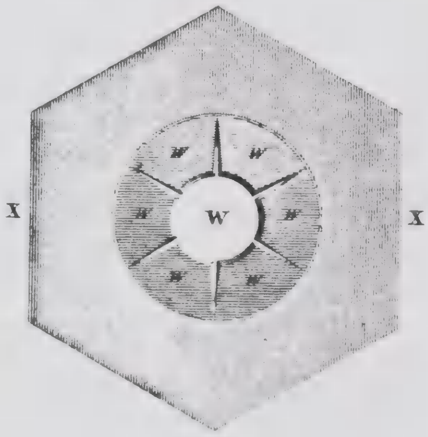

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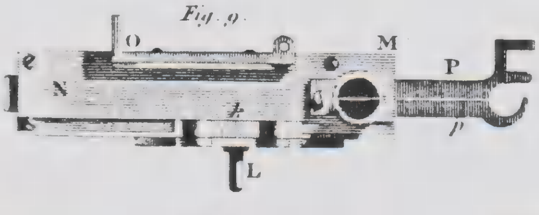

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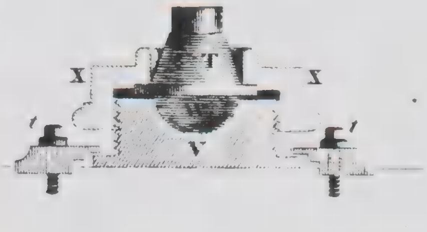

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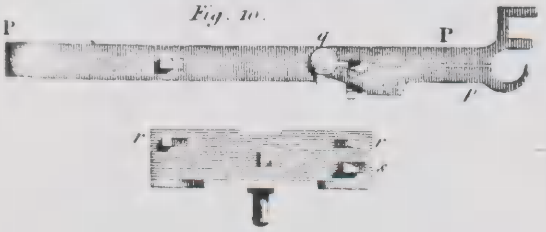

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         NOTES: Engraved half-title.
                Edited by J. Millar. cf. Brit. Mus. Cat.
                Plate 298 in two parts.

      SUBJECTS: *S1 Encyclopedias and dictionaries.
       AUTHORS: *A1 Millar, James, 1762-1827, ed.


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 HU LONG DISPLAY  łpage 2 of 2      Item 7 of 11 retrieved by your search:
FIND TI ENCYCLOPAEDIA BRITANNICA//yr<1820
---------------------------------------------------------HU HOLLIS# AXR2346 /bks
 Encyclopædia Britannica, or, A Dictionary of arts, sciences, ... (CONTINUED)

      LOCATION:łWidener: Harvard Depository Cyc 289
                  Library has: 20 v.
                  C1 - Enter DISPLAY C1 for circulation information








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 HU LONG DISPLAY  ✗page 1 of 1      Item 8 of 11 retrieved by your search:
FIND TI ENCYCLOPAEDIA BRITANNICA//yr<1820
--------------------------------------------------------HU HOLLIS# AXR3940 /bks
         TITLE: Encyclopaedia Britannica, or, A Dictionary of arts, sciences,
                  and miscellaneous literature ... illustrated with nearly six
                  hundred engravings.
       EDITION: Fifth edition
     PUB. INFO: Edinburgh : Printed for Archibald Constable & Co., 1817.
   DESCRIPTION: 20 v. : ill. ; 28 cm.

      SUBJECTS: *S1 Encyclopedias and dictionaries.
       AUTHORS: *A1 Broadwood, Thomas.
                *A2 Archibald Constable & Co.
        PLACES: Scotland--Edinburgh.

      LOCATION:✗Houghton: Harvard Depository Cyc 290
                  Library has: 20 v.

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 Index            REDo - edit search        STORe - save for email      COMment
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 HU SHORT DISPLAY /page 1 of 2      Item 9 of 11 retrieved by your search:
FIND TI ENCYCLOPAEDIA BRITANNICA//yr<1820
--------------------------------------------------------HU HOLLIS# AXR3503 /bks
         TITLE: Encyclopædia britannica; or, A dictionary of arts, sciences, &c.
                  on a plan entirely new: by which, the different sciences and
                  arts are digested into the form of distinct treatises or
                  systems, comprehending the history, theory, and practice, of
                  each, according to the latest discoveries and improvements;
                  and full explanations given of the various detached parts of
                  knowledge, whether relating to natural and artificial objects,
                  or to matters ecclesiastical, civil, military, commercial,
                  &c., together with a description of all countries, cities ...
                  a general history, ancient and modern, of the different
                  empires, kingdoms and states, and an account of the lives of
                  the most eminent persons in every nation, from the earliest
                  ages down to the present times ...
       EDITION: 2d. ed. ... greatly improved and enl. Illustrated with above two
                  hundred copper plates ...
     PUB. INFO: Edinburgh, Printed for J. Balfour and Co. [etc.] 1778-83.
OPTIONS: -----------------/More - to see next page ----------------------------
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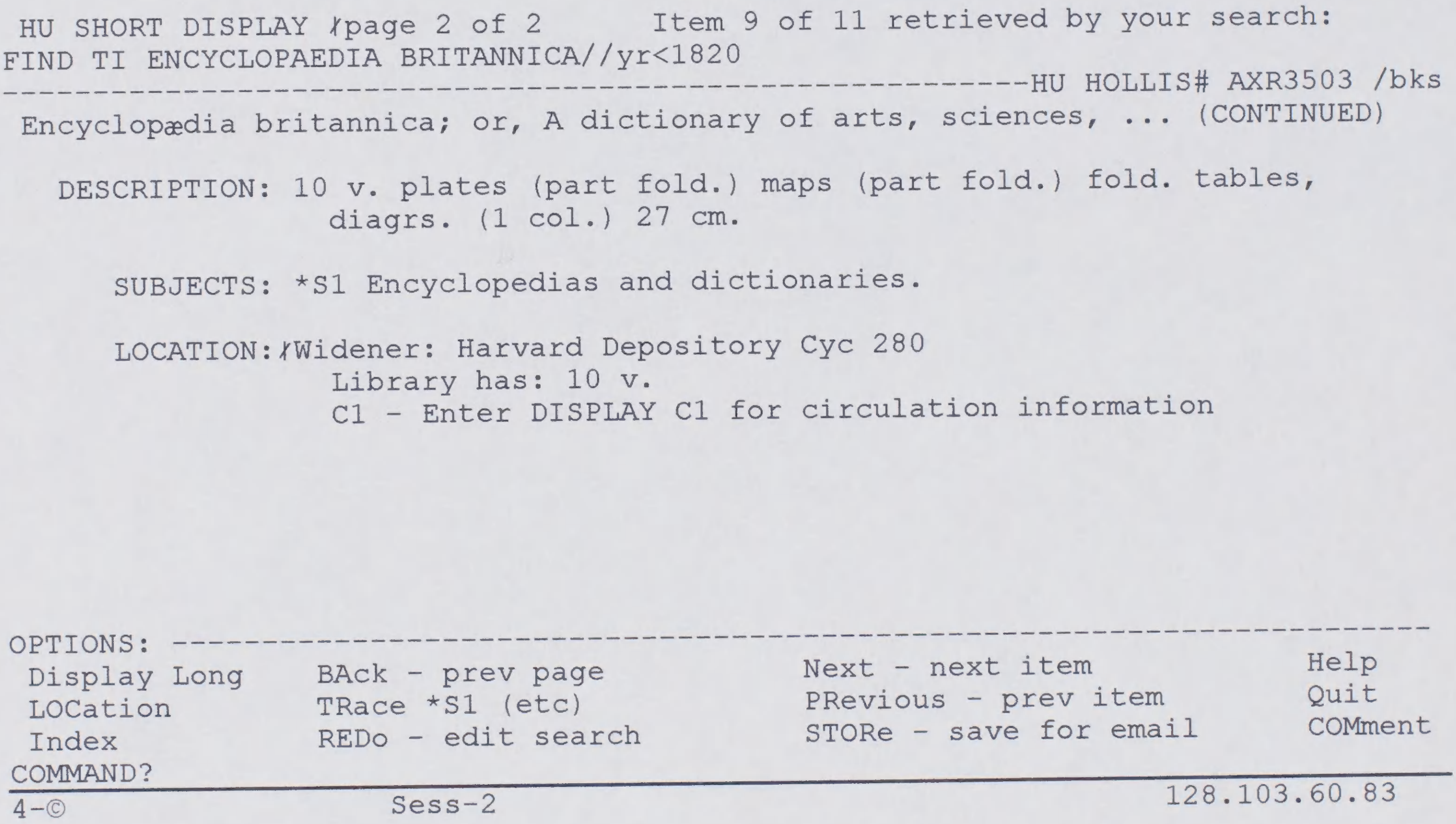

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 HU SHORT DISPLAY łpage 2 of 2      Item 9 of 11 retrieved by your search:
FIND TI ENCYCLOPAEDIA BRITANNICA//yr<1820
---------------------------------------------------------HU HOLLIS# AXR3503 /bks
 Encyclopædia britannica; or, A dictionary of arts, sciences, ... (CONTINUED)

   DESCRIPTION: 10 v. plates (part fold.) maps (part fold.) fold. tables,
                  diagrs. (1 col.) 27 cm.

      SUBJECTS: *S1 Encyclopedias and dictionaries.

      LOCATION:łWidener: Harvard Depository Cyc 280
                  Library has: 10 v.
                  C1 - Enter DISPLAY C1 for circulation information



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 HU SHORT DISPLAY łpage 1 of 1      Item 11 of 11 retrieved by your search:
FIND TI ENCYCLOPAEDIA BRITANNICA//yr<1820
--------------------------------------------------------HU HOLLIS# AKT8092 /bks
         TITLE: [Encyclopaedia britannica.]
                Supplement to the third edition of the Encyclopedia britannica,
                  or, a dictionary of arts, sciences, and miscellaneous
                  literature, by George Gleig. Illustrated with fifty
                  copperplates.
     PUB. INFO: Edinburgh, T. Bonar, 1801.
   DESCRIPTION: 2 v. plates, diagrs. 27 cm.

      SUBJECTS: *S1 Encyclopedias and dictionaries.

      LOCATION:łWidener: Harvard Depository Cyc 282
                  Library has: 2 v.
                  C1 - Enter DISPLAY C1 for circulation information


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